



FRIDAY, SEPTEMBER 30, 1898.

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Contributions.

The Air Brake Litigation.

The Westinghouse Air Brake Company, }
Pittsburg, Pa., Sept. 24, 1898. }

To the Editor of the Railroad Gazette:

It is reported to us that a statement is being circulated to the effect that the decision of Judge Wallace of the United States Circuit Court in our suit against the New York Air Brake Co. for infringement in the manufacture and sale of its present form of triple valve, is a final one. Such a statement is utterly without foundation, as the case in question will not be finally decided until after it has been heard by the Court of Appeals. The hearing before the Court of Appeals is set down for the next term—which opens about the last of October—and the merits of our case are such that we have good reason to believe that the decision of the Court of Appeals will be favorable to us. THE WESTINGHOUSE AIR BRAKE CO.

Creeping Track.

Sept. 23, 1898.

To the Editor of the Railroad Gazette:

In your paper of Sept. 16, I note an interesting report concerning creeping track, made to the Roadmasters' Association. From considerable experience, I would state generally that the more elasticity there is in the track, the greater will be the tendency to creep. This will explain most of the facts noted in the report. The higher rail on curves having more ballast under it and the ballast usually looser at the end will creep more than the lower rail, which is more solidly supported. On my road, 75-lb. rail that is laid on good ties and ballasted with stone, has not run an appreciable amount in eight years; this on double track and quite steep grades.

What I wished particularly to note is the trouble often experienced on bridges. I have two long bridges, both double track. In one, the stringers are nearly under the rail, hence a practically rigid support. In the other, three stringers support the two tracks, and hence the rail is some distance from stringer. The ties are, of course, strong, but necessarily springy. In the first bridge, in spite of heavy grade, we have no trouble with rail running. On the other, with a level grade, we cannot hold it at all. I advance the above as one strong reason (there are plenty of others) against a wide spacing of bridge stringers, or the carrying of two tracks on three girders, as in the bridge in question.

ENGINEER M. OF WAY.

The Kinetic Motor.

To the Editor of the Railroad Gazette:

In at least one of the New York papers of Sunday, Sept. 25, there appeared an advertisement under the heading "Dodge Stored Steam System of Railway Motive Power." This is a subject of some engineering interest, and after reading the following extract from the notice one is at a loss to know whether or not the matter should be taken seriously. "A thousand dollars reward," says the advertisement, "to any expert engineer or other person who can and will prove that any other system of motive power equals the Dodge stored steam system in (1) simplicity, (2) durability, (3) reliability, (4) freedom from offensive features and (5) economy." It may be of interest to point out certain facts that might be of service to some one desiring to follow up the subject and earn \$1,000.

(1) As to its simplicity, it may be justly claimed that the steam locomotive is practically as simple and theoretically more so. Inasmuch as the detailed drawings of the Kinetic motor have, we believe, never been published, little can be said on this point. From what has already been said, however, it may be inferred that this claim is simply on paper.

(2) The durability of this system is simply a question of strength of the different parts and the quality of the material used. The strains on the machinery will be practically the same as in a steam engine of the same power.

(3) For reliability I would sooner pin my faith to an engine that has a fire continually burning in the boiler than to a quantity of superheated water with a small fire under the storage reservoir to provide for the various losses. It may be questioned if the claim for reliability for this system is not the weakest of all.

(4) "Freedom from offensive features" may mean almost anything. On a country road steam, smoke, sparks and cinders from a steam boiler may not be as "offensive" as an auto-mobile that moves along with a wabbling motion and starts like a grasshopper. Such non-essential, but rather unpleasant features, we trust, have been entirely eliminated in the Kinetic motor.

(5) How can the economy (on the basis of efficiency) of these motors exceed to any considerable degree, if at all, that of either a steam engine or cars running on the trolley system? There are certain inevitable losses with a steam motor which cannot be overcome, and it may be added that there is a loss due to radiation in what is erroneously called a "steam storage" motor that does not occur to an equal degree in the direct use of steam.

Of course we must admit there are advantages peculiar to the steam storage motor for certain work; but to say, in general, that it supersedes all other systems in the above mentioned particulars is to make a claim as broad as some misguided advocates of compressed air have made for that power. There are especial advantages in almost any particular kind of power, and if the fireless locomotive will do more and better work than other motive powers, the sooner we know the fact the better.

Probably the strongest claim made by the advocates for the fireless locomotive is based on the capacity of water to contain a large amount of heat under high pressure, so that instead of carrying considerable fuel, the heat itself is carried ready for use. This claim has its merits and to it should be given proper weight, but while the theory on which it is based is very pretty, the practical difficulties (as carrying 1,000 or more lbs. of water for a trip of say 20 miles) cannot be disregarded.

T. D.

The Uganda Railroad.

According to a Parliamentary paper lately issued, the surveys done up to March 31, 1898, on the Uganda Railroad, were 263 miles completed, the progress during the year being 148½ miles. Of the entire length of 263 miles surveyed, at least 200 is through difficult country. It is waterless, except for small rivers at long intervals, and covered with dense, thorny scrub, while the surface is much broken and intersected with ravines.

The boundaries of the unoccupied land for a distance of one mile on each side of the line, which has been assigned to the railroad, is demarcated as the rails advance. At the beginning of the year under review the cuttings and embankments had been completed as far as mile 41, and during the year were finished up to mile 139. The progress was much retarded by abnormally heavy rainfall during April and May, 1897, 40 in. having fallen in these two months. The fresh embankments were much damaged, and a further advance temporarily checked, as all available labor was required for repairing them.

This exceptional season, combined with fresh earthwork, caused much sickness and mortality among the coolies and others employed. The hospitals were crowded, 10 per cent. of the total number engaged being patients, and the medical staff, several of whom were themselves ill with fever, found it almost impossible to efficiently cope with the sickness. With the advent of the comparatively cool, dry weather in July the general health gradually improved.

The want of engine power was greatly felt, and was due to the engineering strike in England, by which the supply of locomotives arranged for was much delayed. When it is remembered that the ruling gradient is 1 in 50, and the general grade elsewhere 1 in 66, the serious effect of the insufficiency of engine power can be appreciated. The necessity for transporting troops and Government stores during December, January, February and March also necessarily impeded construction work.

During the early part of December last the section from Kilindini (Mombasa) to the Voi River (100 miles), was inspected, and was passed as fit for the carriage of passengers. This section was opened to the public for goods traffic on Dec. 15, but owing to pressure of troop traffic and the conveyance of other Government stores, the opening for passengers was delayed until Feb. 1, 1898. Previous to December,

1897, Government caravans and stores to the extent of 2,600 porters and 300 tons of goods were carried for an average distance of 80 miles.

For the first three months of 1898 the traffic earnings were as follows: From coaching (parcels and mails), Rs.64,570; from goods, Rs.32,170; from railroad stores, Rs.29,720; total, Rs.126,460, giving an average of Rs.88 per mile per week, or, excluding the earnings from the carriage of railroad stores, Rs.67.6 per mile per week. There has also been a large saving to the Protectorates through the cheap carriage of troops and stores over the long, waterless track between the coast and the river Voi. The original estimate for the line for 1897-8 was £714,000. On revision this estimate was reduced to £589,600. The estimate for 1898-9 is £625,000. A schedule of expenditure up to March 31 last shows a total of £1,005,390.—Railway Engineer.

Master Car Painters' Annual Meeting.

The Master Car and Locomotive Painters held their twenty-ninth annual convention at St. Paul, Sept. 13-16, with an attendance of 91 members. The convention opened with an address of welcome to the city of St. Paul by Mayor Keifer, followed by President C. E. Copp with an annual address to the members.

Officers elected for the ensuing year were: President, H. G. McMasters (Ill. Cent.), Chicago; Secretary, Robert McKeon (Erie), Kent, O.

The subjects discussed were of unusual interest. A report from A. J. Bruning (L. & N.) on tests of paint stock and the durability of paints exposed to the weather, especially on iron, was read. Sixteen different samples were shown which had been prepared by Mr. Bruning for protective coating on iron. The exposed strips of iron were referred to a special committee for inspection, all having been exposed together for one year.

The subject of quick drying colors for passenger cars and locomotives was brought before the meeting in papers read by W. J. Orr (L. S. & M. S.) and G. W. Lord (Fitchburg). The consensus of opinion was that any additional oil added to prepared Japan body colors was injurious, although a small portion of wearing body varnish as a binder might be added with safety and would give additional wear and durability.

"The Stock Room" was introduced in papers read by John Hartley (A. T. & S. F.) and W. C. Fitch (So. Pac.). The stock room is a necessity. It has saved 10 per cent. to the company in time and material where it has been adopted where no stock room had been in the shop previously.

Classification of Painting Repairs on the Outside and Inside of Passenger Cars.—The committee on this subject, F. S. Ball (P. R. R.) and C. E. Copp (B. & M.), presented papers, after which the discussion brought out the fact that it is not practicable in all cases to class the repairs. It is difficult to decide what repairs a car requires until it is through the wood shop and cleaned throughout. Many defects are not discovered until after the car is thoroughly cleaned, especially on the outside.

"Painters and Painting as Compared with Other Mechanical Departments of Railroad Work," was set forth in papers read by J. A. Gohen (C. C. & St. L.), J. H. Ritard (Mobile & Ohio) and C. E. Koons (St. Louis Car Co.). Painters' work being to finish, they could not cover up defects as the other mechanical branches; therefore more care and skill were required. Close attention must be given by the foreman painter to all material, as the paint was the first to be attacked by the elements and was the protector and preserver of the other mechanical work on the car.

Papers on the difficulties and environments of the Master Car Painter were read by A. J. Bruning (L. & N.) and F. W. Wright (Mich. Cent.), showing how the painter was handicapped in doing his work because of poor shops which were poorly heated and ventilated, and also because of time reduced to a few days where weeks were required to give good results.

Papers on "An Historical Sketch of Railroad Equipment, Painters and Their Work in the Early Days," were presented by Warner Bailey (B. & M.) and Jno. A. Putz (Wis. Cent.), which showed the great changes which had taken place and the improved methods introduced in the past 50 years.

"Do the Railroads Give Proper Consideration to the Painting of Freight Cars?" Reports were read by H. G. McMasters (Ill. Cent.), A. R. Lynch (P. C. C. & St. L.) and H. W. Flanagan (Chicago Gt. West.), showing there was yet room for improvement, although some roads take better care of their cars than others, and painting freight cars is being done to a much greater extent to-day than formerly, as the companies find well painted cars are a good advertisement in the freight business of the road as well as in the passenger.

"The Advantages of a Suitable Shop in Which to Paint Locomotives" was considered by A. P. Dane (B. & M.) and Ewd. McLaughlin (M. K. & T.). By having good shops, clean and free from smoke, the engines can be got out in much less time, better work can be done and at a considerable saving in expense.

"Are the Railroads Justified in Surfacing and Varnishing Passenger Equipment Cars and Locomotives?" J. F. Lanfersick (P., C. & St. L.), A. J. Bishop (Northern Pacific) and W. J. Russell (G. R. & I.) presented papers which showed that surfacing was justifiable. Varnishing was also a necessity, not only for appearance, but also because cars cleaned up better while in service and when coming in the shop for cleaning and revarnishing. Surfacing was defined as not only roughstuff and rubbing with pumice stone and water, but where knifing filler and sandpapering was done.

"What Progress, if Any, Has Been Made in the Past Year in Paint Spraying?" Papers were read by F. H. Crocker (K. C. Ft. S. & G.) and H. M. Smithson (Midland), and a general discussion brought out the view that it had come to stay, but was far from perfect. The majority believed it would be a success on a cheap class of painting on large surfaces, but none were willing to fully indorse its use until more satisfactory results could be reached. The spray or mist arising from it was a very serious complaint, and it was not safe to use white lead or any poisonous paint on account of the dangers from inhaling the spray.

The topical questions were then discussed. It was believed to be economy to paint roofing tin on both sides, thus preventing it from rusting.

The use of the gilding wheel in the car shop was a great advantage in striping, on both the outside body of car and the head linings.

For all general purposes it was voted that grain alcohol was best for the car paint shop, and all substitutes, such as wood alcohol or alkaline, were a detriment to the work and did not give satisfactory results.

The convention adjourned on Friday afternoon to meet in Philadelphia, Pa., Sept. 12, 1899.

The Boston Terminal Station.

The new station is now entirely roofed over, and the advantage it possesses in the direction of thorough lighting is apparent. The station will excel any other in the country in this respect. The main arch of the roof is broken by a longitudinal turret, in the sides of which are continuous glass lights 15 ft. high. The comparatively moderate height of the arch has made the customary construction of an end to the structure unnecessary, and this also helps the illumination.

The structural work is completed, with the exception of that on and under the tracks. A few cars have already been run part way into the shed to facilitate operations, and the exterior work of the office portion of the building is complete, with the exception of a small amount of work still to be finished on the coping over the west side. The windows are in place, the glass bearing the sign of the Pittsburgh Plate Glass Co., and corrugated iron shutters cover temporarily most of the open casements of the shed. Part of the wainscoting of the corridors has been finished, and the station itself has been largely turned over to the inside men. The mosaic floor work has been entirely completed, and work has been begun on the walls and ceilings. Many of the offices are in an advanced state of completion, and some are ready for occupancy. Work on the decorations for the main entrance is being pushed, and they will soon be completed. They are of polished Stony Creek granite. These decorations have come in for a great deal of criticism, and are not of a pleasing character. A far more serious blunder has been made in the design of the roof. This is so flat that the whole building presents a squat appearance that is far from agreeable. Fortunately, this defect is apparent only from the rear of the building.

The power house is nearly finished, and the massive steam and electrical machinery is being put in. Excavation for the express and mail building west of the main yard is also under way.

The station will be ready for the use of the Plymouth and Midland divisions by Jan. 1, though the heating apparatus will probably not be complete by that time.

The approach to the station is in a state of what appears to the outsider to be hopeless confusion. Over 40 pile drivers are at work in the immediate vicinity of the structure, and fully that number of derricks. An entire corral of donkey engines is being used for these machines, and for the numerous centrifugal pumps which are emptying the pile ditches. The soil is taken out to a depth of about 15 ft. before the piles are driven, and then they are pounded down and cut off on a level about that distance below the surface of the adjacent street. On top of the artificial footing thus made the foundations for the track will be laid. Under the proposed location of each track three rows of piles are driven, the distance between centers being, in some places, less than 3 ft.

The office room that will be given by the new station will be in excess of what is at present required. This has given rise to some talk of moving the accounting department of the New Haven road from New Haven to Boston, but there is no evidence that this change will be made.

The westerly side of Summer street has been

cleared by the terminal trustees, and the city paving department is in full charge. The work of completing the surface of the roadway is under way. The temporary office building that has stood near the corner of Atlantic avenue and Summer street has been abandoned by the contractors, and is now being torn down.

A massive rolling lift bridge is to span the Fort Point channel. For the erection of the steel work of this bridge a traveler 136 ft. high, one of the tallest ever used, will be built.

The High Cost of Light Railroads in England.

I think I am safe in prophesying that English light railroads will surpass in capital cost the light railroads of every other country by a percentage at least as great as that by which the capital per mile of our normal railroads exceeds the capital found requisite for similar lines elsewhere. It would, I suppose, be safe to say that the cost of the Continental chemins de fer vicinaux, d'intérêt local, Kleinbahnen, or whatever else they may be called, ranges as a rule between £2,500 and £3,000 per mile. The estimate of capital required for light lines here is fully double as high. I have taken the first eight schemes sanctioned, and I find that they provide for raising £760,000 for the construction and equipment of 103 miles of line, in round figures an average of £7,400 per mile. The Basingstoke & Alton line, with a little over £5,000 per mile (this, as I understand, includes nothing but land and construction), is the cheapest of the lot. One of the schemes is estimated to need a capital of over £9,000 a mile, while three others are put down at between £8,000 and £9,000. Indeed, I took part in an inquiry the other day down in Cornwall, in which a light railroad was promoted, estimated to cost about £13,000 a mile.

Whether railroads built at such a price for the accommodation of the scanty traffic of agricultural districts can ever pay as commercial undertakings, remains to be seen. The directors of one important company, the Great Eastern, which serves a district where light railroads are, perhaps, more needed than in any other part of the country, evidently think it impossible, for they have lately announced publicly that they will not undertake the construction of light lines, unless in each case one-half of the cost is found as a free gift by the public authorities, either national or local.

It will, perhaps, be interesting to take an individual line, preferably one whose accounts and history are not complicated by dependency on an existing main line company, and give in some detail its salient features. For this purpose I will select the Crowland & District Light Railway, a line in the fen district of the East of England, sanctioned in April last to serve Crowland, a small town or large village famous in history as the site of a great Abbey, which every reader of Charles Kingsley's romance, "Hereward the Wake," will remember. The line, which is of normal gage and begins and ends by junctions, not with the running lines, but only with station sidings of existing companies, is nine miles in length and is promoted and intended to be worked by an independent company. Its authorized share capital is £45,000; in other words, it is estimated that land and works will cost about £5,000 a mile. In addition, the company is empowered to borrow £15,000, a sum which, according to custom, is expected to provide for cost of promotion, engineering, administration during construction, and equipment with the necessary plant and rolling stock. The country through which the line passes is practically level. The only engineering work of importance is apparently the crossing over a drainage canal, which, under the stringent provisions contained in the order, has to be crossed by a steel girder bridge with minimum spans of 30, 40 and 30 ft. respectively. The land is doubtless valuable as agricultural land, but after all, it is only agricultural.

[Other particulars of this railroad appeared in the Railroad Gazette, Sept. 9; therefore we omit them from Mr. Acworth's letter.—Editor.]

It is difficult to believe that this Crowland line can be worked at a less cost than 60 per cent. of the gross receipts. In order, therefore, to leave £3,900 a year net revenue (= 5 per cent. on £60,000 capital), it will need to earn £7,500 per annum gross, that is £16 per mile per week. I greatly doubt whether it will earn any such sum. In other words, I do not think that light railroads, unless their capital cost can be brought down below the figures that are being accepted at present, are likely to prove remunerative undertakings. But meanwhile their promotion goes merrily forward, and it is undoubtedly in the interest of the public that it should continue to do so. Whether it will come to an abrupt stop when the actual results of the pioneer lines come to be published, whether grants of public money—so far conspicuous by their absence—will be made to enable promoters to go forward with necessary lines, or whether, lastly, English railroad men and the public will gradually learn to be content with a less expensive standard of construction and a less ample scale of compensation to dispossessed land-owners—all this must remain for the future to determine.

W. M. ACWORTH.

The Chinese Eastern Railroad.

In the fall of 1897, when I drifted down the Iman River, and the Chinese Eastern Railroad engineers were seeking a location at the headwaters of possible navigation from which to send barges of building material into Central Siberia and Manchuria, the spot where the thriving town of Iman now stands was a snow-clad wilderness, without sign of life. To-day, after an absence of little more than half a year, I return to find a city sprung up in the desert; a beehive of activity with thousands of men at work building barges and steamboats. Iman, unknown to the latest map-makers, has become a thriving center and the point of distribution and construction of the Chinese Eastern Railroad, before the news of its



Peophil Osipowitch Girshman.
Engineer in Charge of the Port Arthur Branch of the Chinese Eastern Railroad.

founding could travel by mail across Siberia. Such towns are springing up daily in Manchuria and Siberia under the touch of the magic wand of the Russian Government. All through Siberia and Manchuria this marvelous evolution is going on. I have been dazzled by the wonderful growth of many of the cities of Western America; but it is like Aladdin's dream to return to this icy Northern climate after the interval of but a single winter and find cities filled with teeming multitudes where I had the year before hunted the wolf on trackless steppes. Great is the power of the Czar, and almost as wonderful is the civilizing influence of the railroad.

The engineers of the Chinese Eastern Railroad and the Siberian road have already laid out locations for the towns and cities to come, and the Government is sending the populations to fill them. All through Manchuria and the Amoor River district, Russian

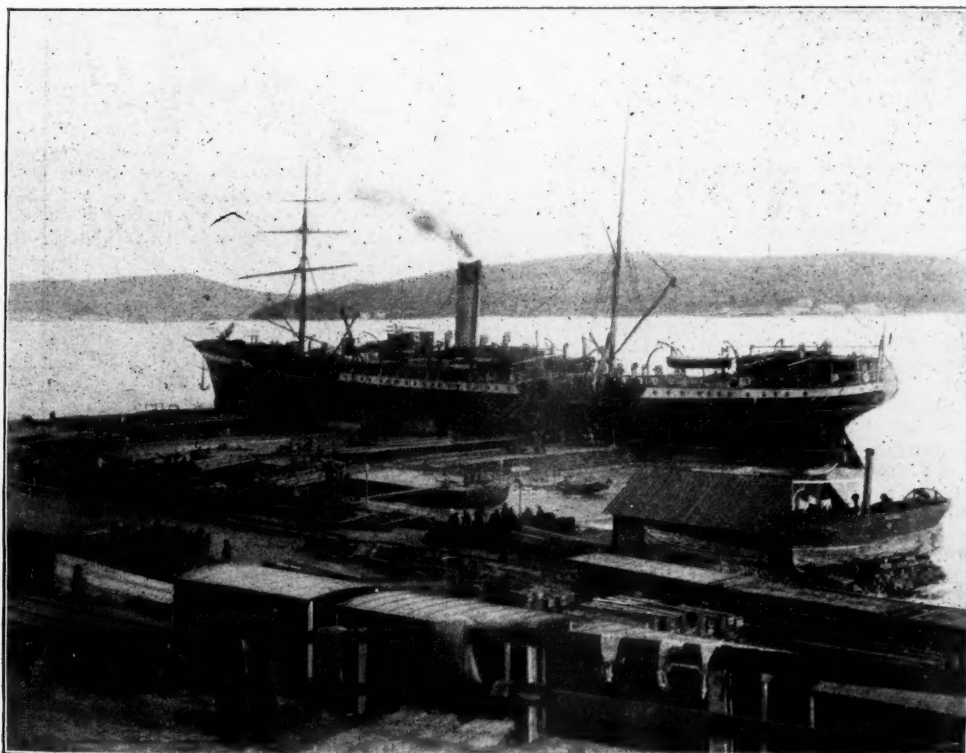


Severin Markuwitch Wachowsky
Traffic Manager of the Chinese Eastern Railroad.

towns and cities are springing up. In summer great transports sail fortnightly from Odessa on the Black Sea in Europe, through the Suez Canal for Vladivostok, and until the harbor is frozen over a constant stream of humanity flows from the sides of the vessels to the railroad docks of Russia's most eastern city. Nor does the work of populating Siberia cease in winter, for last March, when I sailed from Nagasaki in the Japanese steamship and we reached the frozen harbor, we found great ice breakers ready to go before and cut a channel for us through the ice. For miles they pounded their way through the frozen bay until they could go no farther. Then they cut an immense dock in the ice; a track was rapidly run out from shore on the thick ice, and soon we were unloading heavy American freight to the tracks of the Trans-Siberian road. At present the Baldwins are building 65 locomotives, which must come to Vladivostok, and will travel thence by rail to Iman, when they will be transferred to barges and travel thousands of miles by water to the Amoor, up the Amoor and Sungari Rivers to Chulanen in Central Manchuria.



Iman, Siberia, in the Fall of 1897.

Iman, Siberia, in the Spring of 1898.
Showing over 1½ miles lined with steel barges and steamers.

Discharging Rails and Railroad Supplies at the Chinese Eastern Railroad Pier at Vladivostok in Winter.

No tongue can describe the richness of Manchuria; in the mountains minerals and precious metals abound without stint, and in the valleys the richest crops in the world are grown, while on the table-lands roam millions of sheep. This is the land through which the Czar's railroad will run; here he will build great commercial centers; Chulanen has already been selected for the palace city, and American machinery is being shipped to asphalt the streets of this strange city, which Russia is modernizing. Theatres are going up, and palaces are being built, while a constant population is pouring into the city. This is the central point of the Manchurian railroad system; located on the banks of the Sungari River near the center of Manchuria; the great railroad is being built in both directions from its walls, while a steamboat and barge line connects it with Iman, from whence come the materials for construction. This is the first time in history of railroading that a steamship line has been established to build a railroad.

It was only last April that the engineers decided to change the route of the Manchurian railroad further north, and build it through Chulanen, instead of by way of Budune. About that time certain spheres of influence were decided on by Russia, and soon another line of railroad will connect Chulanen with Girin and Port Arthur, a seaport which is kept open the year round without the assistance of ice-breakers.

There is great opportunity in this wonderful country for everyone, American or otherwise, who speaks Russian. Every luxury of civilization is being imported, and even at Iman there are Turkish bath houses, with days set aside for the ladies, besides hospitals supplied with every known appliance of science, purchased in America, and manned by capable physicians. While here I attended a "zakouska," given to Mr. Kerbetz, Vice-President, Mr. Jugowitch, Chief Engineer and Mr. Wachowsky, Traffic Manager, by S. O. Przevalsky, the resident engineer at Iman. No epicure could desire a more luxurious banquet. Although given in a club house flying the Manchurian flag, delicacies were brought from every corner of the globe to this out of the way spot, so far removed from civilization that the world does not yet know that it exists. Still but little known to the outside world, Manchuria is merging into a new civilization; hitherto stagnant and unprogressive, she is now in the throes of a new birth.

The Chinese Eastern Railroad now under construction from half a dozen points, is the agency by which the change is being wrought, and behind it is the enterprising Russian Chinese bank, owned and controlled by the Russian Government.

I have traveled considerably on the projected Manchurian Railroad, but no words can do justice to the marvelous work of the men who are overcoming every known obstacle in railroad engineering. These men have given me every opportunity to examine most minutely the result of their thought and labor, and the most momentous enterprise in which Russian brain, Russian energy and Russian capital have ever been invested. The only Chinese represented in the construction of the Chinese Eastern Railroad are the coolies.

Few realize the scope of the Trans-Siberian Railroad and its branches now under construction, reaching from the Baltic, at St. Petersburg, to Vladivostok and Port Arthur on the Pacific; in all, about 8,000 miles. It is but a few years ago that the present Czar, then Czarowitch, drove the first spike at Vladivostok, shortly before the attempt to assassinate him at Nagasaki, Japan. About half the road is completed, and trains will be running through from the Baltic to the Pacific in 1903.

From Vladivostok, the Eastern terminus on the Pacific, north to Khabarovka and the Amoor, the road is completed, following the valley of the Ussuri River for about 500 miles, but at Iman the transportation by water commences; the material is placed on barges and towed by steamers north to Khabarovka, then west 200 miles on the Amoor to Michael Simonovsk, where the hard work begins, as the barges here turn into the Sungari River and go up stream 500 miles into Manchuria until Chulanen is reached.

Chulanen was founded very recently to serve as a base of the surveys for the railroad, and, while so near this region, it is not difficult to picture its immediate future. Viewing it as it will probably appear one year from the time of this writing, we find it a railroad center of great importance—greater, perhaps, than any other within a radius of 4,000 miles. Though at present unknown to geographers, it will not be so then. Its birth is modest. Its prospects are most brilliant and its success is not dependent on any temporary or transient condition, but may be predicted with absolute certainty and unerring judgment. Elsewhere the history of railroad construction throughout the world reveals the fact that here and there some place has of necessity sprung up, which in the course of time has taken its place among the important centers of the earth, and it is at this point which we are now considering that I think this spot will be found in this instance.

The chief of the technical department of the Chinese Eastern Railroad, Nicolai Sergewitch Swiagin, was the first Russian engineer to make an investigating tour through Manchuria, and the difficulties he had to encounter may be imagined when it is

known that his preliminary surveys were made long before the concession for the road was procured from the Chinese Government. So well was his work accomplished that the Government has rewarded him by making him Superintendent and Engineer of Construction on the branch connecting Nikolsk with Poltavsky.

from the Caucasian District, a convict with a record of killing four men, now body-guard at the leading hotel; squatted at his feet a Corean, while near me on the ground sat a Chinese boy, and on my other hand an aborigine of the Amoor, wrapped in his skin robes.

Already the Government has placed companies of

Ignatius, who is in full charge of the practical department connected with the construction of the railroad, while Mr. Pheophil Osipowitch Girshman is the engineer in full charge of the Port Arthur branch, and Mr. Bogdanoff is Financial Director of the entire enterprise. These form the brilliant coterie of Russian men who, with Mr. Kagevnikoff, in charge of the mechanical department, are rapidly becoming known to the manufacturers of America, and soon, when the great trans-Siberian road crossing Europe and Asia is opened to traffic, their photographs and accomplishments will be as familiar to the world as those of the great De Lesseps.

The Chinese Empire has put up a large deposit, at the earnest solicitation of Russia, to guarantee against depredations by Chinese subjects, with whom railroads are unpopular, especially if the roadbed passes through a cemetery, where they go to enjoy themselves on holidays, meditating on the graves of their ancestors. The President of the road is an able Chinaman, who was once Minister to Germany, and for the flag of the road he and the representatives of the Czar have adopted a cross of the Russian and Chinese flags. This flag will doubtless become first confusing and then familiar to the citizens of the Pacific coast ere long, as it will fly from the taffrail of the steamships belonging to the Chinese Eastern Railway.

Even the so-called "Manchurian Ochranas" (guards) have had to adopt a special uniform, part Russian and part Manchurian, but they still look out solely for the interests of Russia with their accustomed vigor.

Siberia is far less cold than the Klondike and grows vast areas of wheat as fine as the Manitoba grain, while Manchuria is in a temperate zone and will soon have her doors forced open, and the world will be invited to come in and partake of the riches.

M. SERGEY FRIEDE.

Iman, Siberia, May, 1898.

The Chicago Drainage Canal Litigation.

An important controversy now in progress between the Sanitary District of Chicago and the Commissioners of the Illinois & Michigan Canal (which is under state control), promises to seriously delay the completion of the work on the drainage channel below the controlling works. It was expected that this channel would be ready for use about September, 1899, but it now appears that the work may be delayed another year through litigation.

It seems that the District is required by law to build the channel through the upper basin at Joliet, Ill., and it is further provided that it shall co-operate with the Canal Commissioners so that no damage be done to the canal. In accordance with this law, an agreement was entered into last March by which the right to make use of certain necessary lands in the upper basin was sold by the canal officials to the District Trustees; other land was added later, and the total price was \$7,630, which amount was paid to the treasurer of the canal Aug. 10. By the agreement the District Trustees were also obliged to replace such



Corean
Caucasian.

Vladivostok
Merchant.

American.
Chinese Boy.

Austrian Engineer.

Amoor Native.

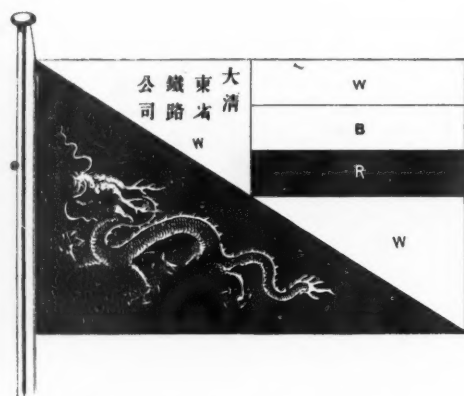
Russian Izvoschik.

A Photograph Taken in the Street at Vladivostok.

I have been asked: "What is the purpose had in view by the promoters of this railroad, and what the end?" The object is to bring into direct communication by the shortest way with the home government at St. Petersburg the seaport newly acquired by Russia from China, and the only direct outlet which Russia has to the open sea—Port Arthur. Upon the completion of the Chinese Eastern Railroad such direct communication will have been established, and then Port Arthur will be in fact an integral and most important part of the Russian Empire.

It is part of the scheme, unlike the organization of the main trans-Siberian road—to hold and maintain the vast empire of Russia in one compact, powerful mass which will render it practically impossible for any nation to detach any portion of the empire without a successful disintegration of the whole. The project, therefore, while individual in name, is worldwide in its scope and character. It reaches beyond national and international relations and effects, and upon its success depends in large measure the welfare and material progress of a nation, which it requires no seer to foretell, will in course of time occupy a dominant position in a considerable portion of the world.

The attainment of such marvelous results involves,



Flag of the Chinese Eastern Railway.

of course, the employment of extraordinary means by those in every way capable of their selection. No great movement has ever succeeded without a great head to direct it. In this respect the present enterprise is exceptionally fortunate. The men at its head have already demonstrated that under their direction success is well assured, and we can clearly look forward to the time when they will deliver into the hands of their master, the Czar, the means by which a vast empire will forever thereafter be rendered the most extensive and powerful compact empire on the face of the globe.

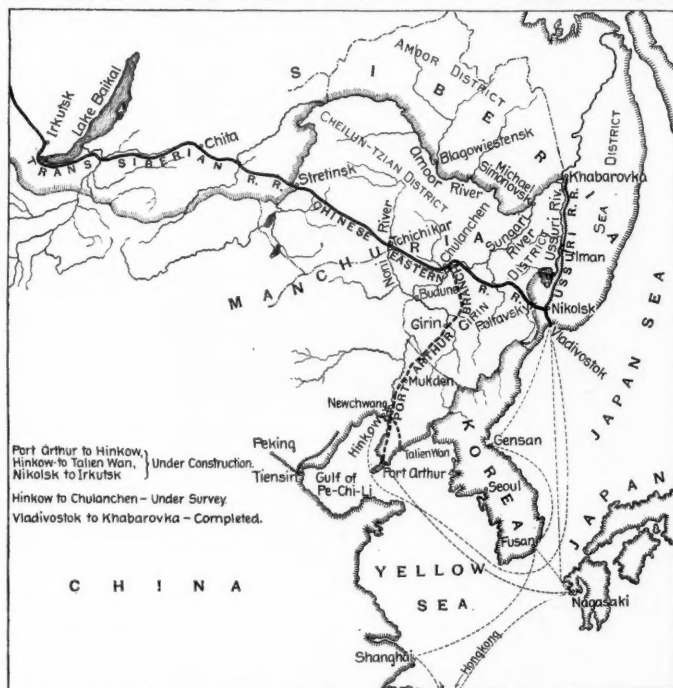
In Vladivostok every nationality is to be met. I had a photograph taken on the street. There chanced to be in the party Americans traveling through the country, one Dr. Smith, fresh from South Africa; an Austrian engineer, a Russian born in Alaska before it became American, a Cossack driver, an ex-convict, also a fine looking specimen of Russian manhood

Cossacks along the railroad lines to protect the Russian interests. Telegraph poles have been strung, and Col. Gernyross, under whom this great army acts, can be communicated with by the hundreds of military stations which are located every few miles apart over thousands of miles of territory; the system is as perfect as human forethought can make it.

Some idea of the vastness of the enterprise and rapidity with which the work is being pushed can be gathered when I record the fact that the Vice-President of the road, S. I. Kerbetz, placed a single order in England last summer for 40 steel barges and 15 steamers, to be delivered within a period of seven months. These are now in use on the Iman River, and under the management of Engineer S. M. Wachowsky, who has charge of the river transportation, and in these, great bridge girders from the Carnegies, and millions of American tools, besides the 65 Baldwin locomotives, will travel thousands of versts inland to build the Chinese Eastern Railroad.

Russia will soon be almost as near America as Germany now is, in fact, nearer to San Francisco, and with the friendly feeling that exists between the two governments it will doubtless be a common thing in the public schools of the United States before many years pass to teach Russian to the children of America, for the Russians and Anglo-Saxons now encircle the globe in the Northern Hemisphere. Russia is free to all comers; thousands of tons of American materials will now go into Vladivostok yearly, and the Chinese Eastern Railroad has long had its purchasing agents in America, where a permanent office is maintained. The Pacific is destined to become as great a ferry for ocean greyhounds as the Atlantic, and now that the trade between the United States and Vladivostok is increasing yearly by leaps and bounds, and every kind of manufacture, from the American locomotive to the Yankee typewriter and the various makes of bicycles, are finding their way into the territory opened up by the new railroads, it is as well for Americans to know something of the men whose brains projected the opening up of this wonderful country.

While there is nominally a Chinese President of the road, Vice-President Stanislav Ipolitowitch Kerbetz is the head at St. Petersburg, and Mr. Alexander Osipowitch Iugowitch is the Chief Engineer in full charge of the Chinese Eastern Railroad, and the greatest power in Manchuria, while but scarcely second to him is Mr. Sergey Vladimirovitch



Map of Eastern Siberia and Manchuria, Showing Chinese Eastern Railroad and Extensions.

water power as might be destroyed by the changes in the canal, amounting to about 900 h. p., which is now leased by the Commissioners to the Economic Light & Power Co., of Joliet. The Sanitary District then proceeded to spend about \$30,000 in embankments and excavation.

When it was learned that a water-fall of about 6,000 h. p. would be formed at Dam No. 1 the Canal Commissioners requested a conference, and asked

that control of all power developed be given to them, and to enable them to utilize it they asked to be allowed to buy some land near the dam which the Trustees had previously condemned; this the Sanitary District refused. Later, the Canal Commissioners filed a report in court with a claim that the embankments to be erected were insufficient and that the new work would damage their present water power. They also repudiated their former agreement and claimed that they had no legal authority to enter into an agreement to sell land to the District and refused to transfer the title; the Sanitary District was

malleable iron. The center plates are of malleable iron with a steel liner, $\frac{3}{8}$ in. thick, so inserted as to take the wear. With these cars are used Chicago grain doors, Dunham door fastenings in connection with Security locking strips, Tower couplers, Westinghouse air brakes, Marden brake beams and McCord journal boxes.

The body bolster, shown in Fig. 2, is an entirely new design, and probably the most interesting feature of the car. It will be seen that this is placed entirely below the sills, and yet the depth of the bolster at the center is 10 $\frac{1}{2}$ in., which depth is ob-

the Chancellor worked with all his might to perfect and extend them. The simplification and generalization of the rules for their management, and the codification and adoption of a uniform tariff throughout Germany, were inspired and stimulated by the Chancellor himself. He was particularly gratified when his friends in the Reichstag proposed a special Department of the Imperial Directorship of Railroads and the Reichstag accepted the scheme and passed a law which created the office.

It was only because of the personal appearance of the Chancellor in the Bundesrath that that body

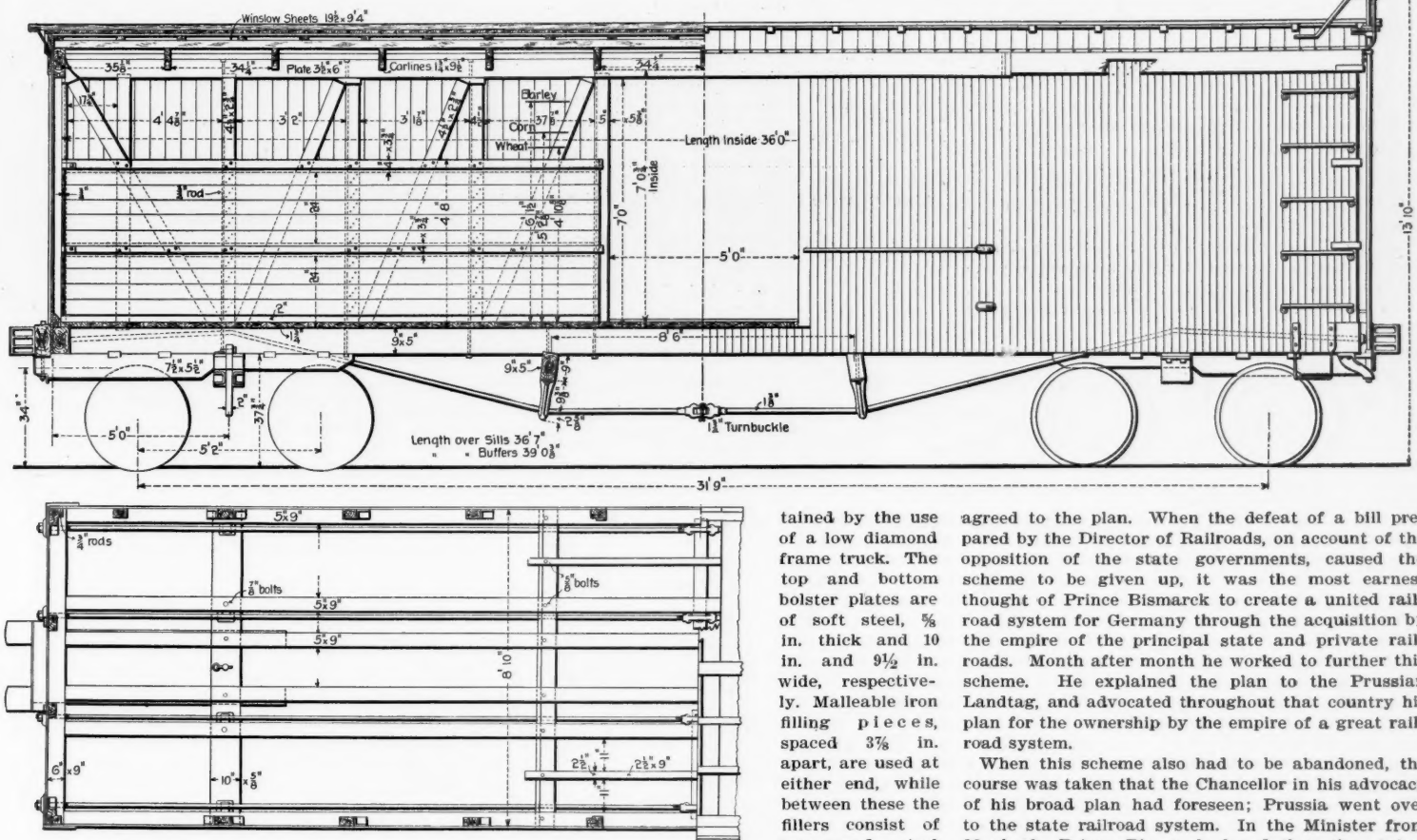


Fig. 1—70,000-Lbs. Capacity Box Car—Northern Pacific Railway.

also enjoined from proceeding with the work. On Saturday, Sept. 3, Judge Hilscher refused to dissolve the injunction obtained by the Canal Commissioners and the case was brought to trial on Sept. 19.

The Sanitary District claims that the Canal Commissioners lease the present water-power to the Economic Light & Power Co. for \$1.34 per h. p., while it is sold to firms in Joliet for as high as \$20 per h. p. per year. Thus if the additional power were turned over to the Canal Commissioners it would be merely to enrich a private corporation. It is also stated that the interest on the investment in the drainage channel amounts to about \$3,600 per day, so that the delay is costly.

The trial is now in progress, but the outcome in the lower courts would seem to be of small matter, as in any event the case will be carried to the Supreme Court, unless some compromise is effected. A decision in the Supreme Court could not be secured before the middle of October, and then, should the decision be favorable to the Sanitary District, but little could be done before the work would be stopped by cold weather. The Sanitary District Trustees have announced that they will not proceed with the work until the questions concerning the control of the water-power are definitely settled.

Northern Pacific 70,000 lbs. Capacity Box Car.

In our issue of July 15, we reported an order by the Northern Pacific for 1,000 70,000 lbs. capacity box cars, which order was equally divided between the Michigan-Peninsular Car Co., Detroit, Mich., and the Illinois Car & Equipment Co., Chicago. These cars were designed by Mr. E. M. Herr, at that time Superintendent of Motive Power of the road, and their principal features are shown by the accompanying engravings.

The inside clear measurements are, length 36 ft., width 8 ft. 3 in., and height, 7 ft. $\frac{3}{4}$ in. The dimensions of the various timbers in the car body are given by the drawings, Fig. 1, and need not be repeated, but the materials used are not so indicated. It may, therefore, be of interest to note that all of the longitudinal sills, side and end plates and purllins are of long leaf yellow pine; oak is used for the end sills, dead blocks, auxiliary sills, draft timbers, needle beams, posts, braces, girths and carlines; tongue and groove pine boards are used for inside lining, outside sheathing and flooring. The outer and intermediate sills are trussed, and all castings, excepting the brake wheel and pocket washer, are of

timbers pass through the body bolsters. Excepting where the pressed steel plates are joined at the center all connections are made by rivets. Because of its great depth and ample proportions, this is probably the strongest body bolster which has so far been designed for flat bottom cars. Bettendorf truck bolsters, made of two 10-in. steel I-beams are used in connection with the Barber patent end roller device, the truck bolster is 13 in. wide at the center and the end rollers are made of round rolled steel, 2 in. in diameter and 10 in. long. We are indebted to Mr. Herr for drawings and specifications.

Bismarck and the Railroads.*

Among the many great public services of the late Prince Bismarck, perhaps none will be more imperishable in their far-reaching consequences than those of the development of the German railroad system. When he came to the head of the Prussian Ministry the railroad system of that country was completely disorganized. Private railroads and pri-

agreed to the plan. When the defeat of a bill prepared by the Director of Railroads, on account of the opposition of the state governments, caused the scheme to be given up, it was the most earnest thought of Prince Bismarck to create a united railroad system for Germany through the acquisition by the empire of the principal state and private railroads. Month after month he worked to further this scheme. He explained the plan to the Prussian Landtag, and advocated throughout that country his plan for the ownership by the empire of a great railroad system.

When this scheme also had to be abandoned, the course was taken that the Chancellor in his advocacy of his broad plan had foreseen; Prussia went over to the state railroad system. In the Minister from Maybach, Prince Bismarck found then the statesman who made his great hoped-for plan a reality, with such brilliant consequences. It is fresh in mind how the going over to the state railroad system in Prussia has brought into being an entirely new order of things, how powerfully the system has developed under state supervision, and how a harmonious working together of all the German lines has been secured. The great Chancellor laid the foundations for this vast work. His memory will never perish from the hearts of the German railroad personnel.

Steel Truck for 70,000 lbs. Capacity Freight Cars—Northern Pacific Railway.

The accompanying engraving shows the essential features of a low roller bearing truck for 70,000 lbs. capacity freight cars, which has been adopted as the standard of the Northern Pacific. The design was made under the direction of Mr. E. M. Herr, Superintendent of Motive Power of the road, and it will be seen that the truck embodies a number of novel features.

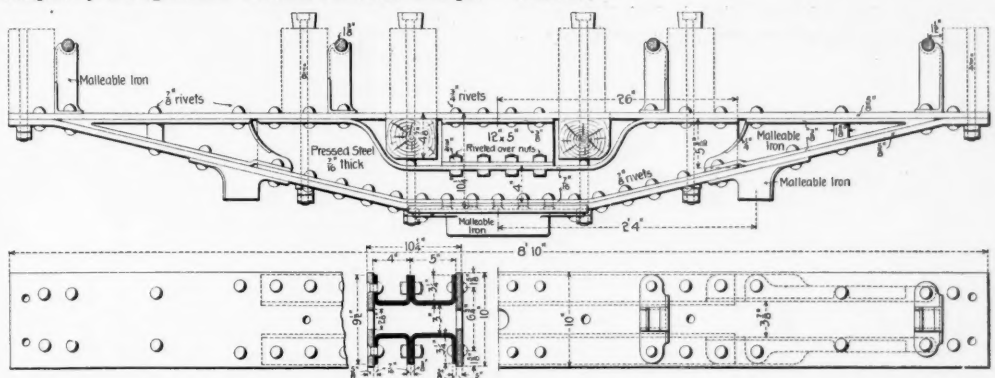


Fig. 2.—Body Bolster, Northern Pacific Box Car.

vate interests predominated. Only in certain parts of the country had the state railroads any influence.

From the first years of his leadership the Prince recognized the lamentable economical and political consequences of this condition. From the time when by the association of the states into the North German Confederation such relations became possible,

*Translated and condensed from the Zeitung des Vereins Deutscher Eisenbahn-Verwaltungen.

The side frames consist of arch bars, which are quite low, being but 23 $\frac{1}{2}$ in. from the under side of the top member to the top of the rail. The advantage gained by the use of the low truck is that it enables a body bolster to be used of much greater depth than is the usual practice. The frames are braced by two steel angles $\frac{1}{2}$ in. x 4 in. x 6 in. The most interesting feature, however, is the truck bolster, which has for a top member a 13-in. steel channel with the flanges down, while the tension mem-

ber consists of four 1½-in. steel truss rods, which have a head on one end and a nut on the other. The top of the bolster is 2 in. higher at the center than at the ends, and the center strut is a malleable iron casting 10½ in. deep. The end casting is of malleable iron, made in two pieces and bolted together beyond the end of the channel by two ¾ in. vertical bolts, the end casting is also bolted to the top member of the bolster by three ¾ in. vertical bolts near the side bearings. The nuts of these bolts are riveted over. The end casting, as seen from the drawings, forms a box through which pass the bolster truss rods, the end casting also having projections which act as guides. The columns and spring seats are formed by a single malleable iron casting, and above the springs is placed the roller device, which is the subject of the Barber patents. A block of wood is used as a filling piece beneath the end casting. The arch bars, columns and spring seat and the application of the rollers is practically the same as was used by Mr. Herr with the 70,000 lbs. capacity twin hopper cars illustrated in the Railroad Gazette, Feb. 4, last.

In the present truck twin pressed steel plates are interposed between the coil springs and the castings, which receive the wear; these plates are held in place by a bolt and thimble which passes through the center of the nest of springs, so that the plates can be readily renewed. In a similar way a thin steel plate is now used to take the wear at the center bearings, which is usually allowed to come on the center plate proper.

Cost of Electric Power for Street Railroads at the Switchboard.—I.*

By R. W. Conant,†

It is my privilege to be able to communicate to you facts and figures bearing on the operation of 44 power stations located at the important street railroad centers throughout the country. These figures cover for the most part the operation of the stations during the past year, and were obtained through the kindness of members of this association, as well as from experience on the roads in Boston. The aggregate capacity of power stations represented is 98,387 k. w., or 131,800 elec. h. p.

The total cost of operation for the production of power alone from these stations during the past year has been \$1,825,000, and if the power had been produced by all at as low a cost as it was in a number of the more economical stations, the saving for the year would have amounted to \$443,300. It is the chief purpose of this paper to explain the "if," and to obtain some idea of its size.

In what has been published on this subject there is a great variety of opinions as to what should be included in the cost of power, and also as to whether the basis of comparison should be the car-mile or k. w. hour, this latter being due to the fact that up to within a few years there has been no reliable instrument adopted by street railroads for the measuring of their output.

The car-mile basis is not a fixed standard. A car-mile up hill takes a great deal of power, while a car-mile down hill should take none, and may be made a source of power.

In the analysis of costs of operation of power stations of various sizes and types, it is first necessary to adopt a standard for the unit of power. We have seen that the car-mile is unreliable. Recording wattmeters are at present constructed which will measure the output in k. w. hours. They can be made to give results which are accurate within a very few per cent. This statement is abundantly verified by actual experience, and is gradually becoming universally recognized. It is no doubt difficult for one who has been accustomed to figure cost of power production on a car-mile basis to reconcile himself to the k. w. hour. It should, however, be very easy for the steam engineer who is accustomed to deal with h. p., since the k. w. hour equals 1.34 elec. h. p. hours.

It was evidently the idea of your Executive Committee in limiting the title of this paper to cost at the switchboard to abolish the car-mile and adopt the k. w. hour as the unit of power. And in comparing the costs from the various stations I shall use this unit. For the benefit of those who are accustomed to considering the costs per car-mile it will be interesting to know that on many roads a car-mile takes just about 1 k. w. hour. This is not true where grades and equipments are extremely heavy; in such cases two or three times this amount may be required.

In the costs of power, whether it is produced by steam or water, should be included the fixed charges as well as the working cost. Under fixed charges are: Interest, depreciation, insurance and taxes on the capital invested in the land, buildings and machinery of the power station. Under operating expenses are fuel, labor, supplies, repairs, superintendence and general expense. In both the fixed charges and operating expenses the component items vary between widely different limits, and it becomes impossible to make a law that will predict the cost under all circumstances. On the other hand, for one who has had experience, it is comparatively easy to predict what the power ought to cost under a given set of conditions. What it will cost must, of course, depend on management as well. In view of the variety of the circumstances governing these costs, I have deemed it advisable to establish for purposes of comparison a standard plant whose conditions are fixed.

It is not my intention to imply that the performance or equipment of this station, which I shall employ as a standard, is ideal or could not be bettered, but rather to assume equipment and performance based on facts obtained from stations in actual commercial operation during a long period of time. As this station is described, its performance may seem to border on the ideal, and there is no question but that its performance is consequent on favorable circumstances, very nearly, we may say, test condi-

tions. It is, however, in my opinion, best to err on this side rather than on the other in establishing a station for comparison.

I shall assume the station to be located on the water front; the exact spot is unimportant, but since this Association has chosen Boston as its meeting place we can consistently locate the station here as well. I have fixed the capacity at 3,600 k. w. The building is erected on firm ground, requiring but little piling or filling, building and chimney of brick.

For equipment, three cross compound condensing engines, cylinders 28 in. and 56 in. x 5 ft. stroke, speed 80 r. p. m. steam pressure 150 lbs., three 1,200 k. w. direct connected generators, six water tube safety boilers, 500 h. p. each, economizers and exhaust feed water heaters, electrically driven feed pumps and coal handling apparatus. Such a station would cost to install as follows:

Capital Invested.	
Building, foundations for engines and boilers, chimney, coal handling apparatus.....	\$120,000
Engines and condensers, heaters, separators and piping.....	91,800
Feed pumps and economizers.....	18,000
Boilers and flue connections complete.....	61,000
Generators and switchboard complete.....	73,800
Land and docking facilities.....	17,000
Engineering and sundries.....	5,000
Total	\$386,600

or about \$107 per k. w. capacity.

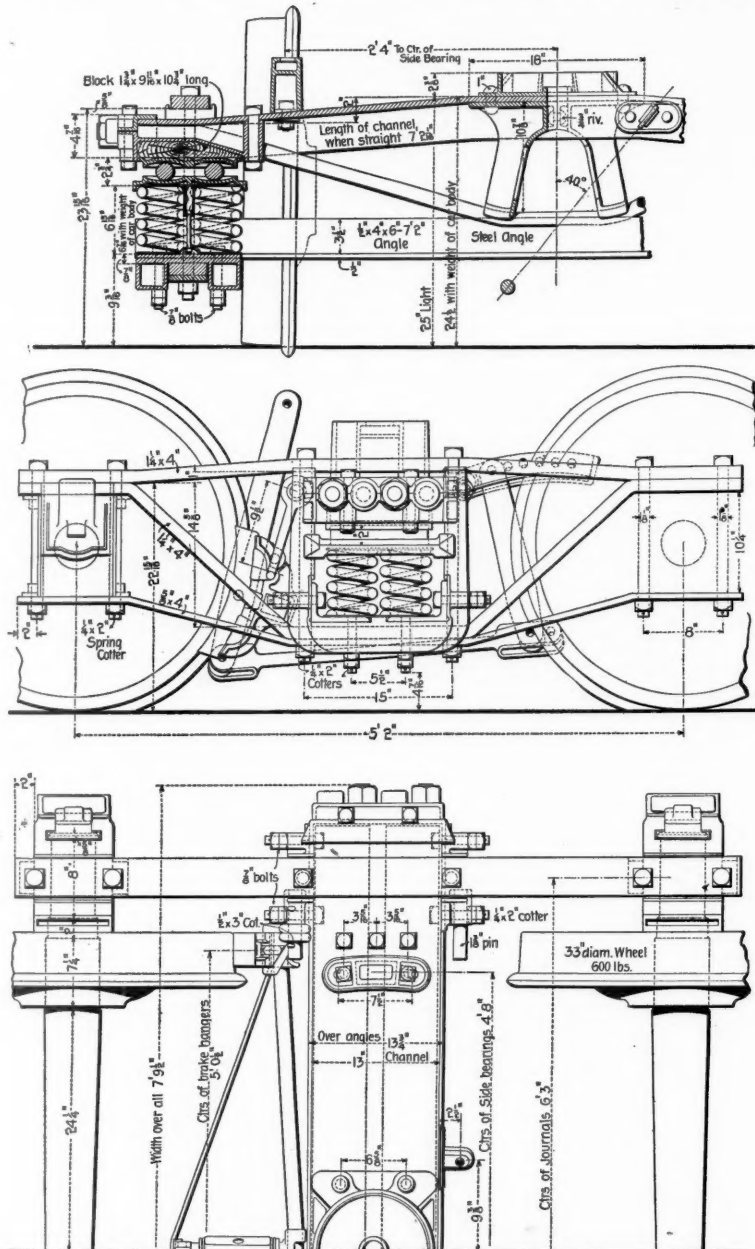
To obtain the figure for fixed charges I assume in-

which gives satisfactory results when applied to station operation.

I can illustrate the method and at the same time derive the operating expenses by applying it to our standard station. It is assumed that this station operates with three shifts of men, the duration of each shift being eight hours. This makes the shift-hours per day twenty-four or 8,760 for the year. The same number of shift-hours would of course be obtained by two shifts of twelve hours each, as is the case with some stations. For the three-shift station, the first two probably would have the full complement of men, while the third would not, as the station might be shut down on that shift. But as there is considerable inspection, cleaning and overhauling, this shift requires almost as many men, though their rate of pay may be less. The highest rates of pay would be on the shift of heaviest load. The crew to operate the standard plant would be about as follows: Two engineers, one oiler, one helper, two firemen, one coal passer; total, seven men per shift.

The average rate of pay per man is taken at 27 cents per hour. This gives 52 cents as the cost of labor an hour per 1,000 k. w. capacity. This multiplied by 3.6, the number of 1,000 k. w. capacity, gives \$1.87 as the total cost of labor required to operate the station per hour.

It will further aid in the analysis of the labor item to introduce the load factor. As this term is sometimes employed in a different sense from that used in this paper, I shall define it to be that per cent. which



Standard 70,000-Lbs. Capacity Freight-Car Truck—Northern Pacific Railway.

terest at 6 per cent., insurance and taxes 3 per cent., depreciation 2 per cent., total 11 per cent., which makes an annual fixed charge of \$42,526.

I shall assume that this station produces 10,500,000 k. w. hours per annum; dividing the annual charge by this figure gives 4 cents per k. w. hour for the fixed charges. The depreciation is not intended to cover repairs, which will be included under operating expenses. The 2 per cent. assumed for depreciation is to establish a sinking fund against the time when the station will have to be entirely replaced by one of more modern and economical design, time of replacement being taken at 50 years. A few years ago the time of replacement should have been assumed much shorter, owing to the imperfect design of power station apparatus then existing. But with the present advanced state of the art improvements cannot be expected to develop as rapidly.

Before arriving at the cost to produce power from this station, it will be necessary to obtain the operating expenses. In making comparisons between stations of different sizes and types the cost of labor is the most perplexing item.

Some stations operate with two shifts, others three. Some have engineers paid at different rates, and men which appear on the records of some are in a capacity which in others is absent or replaced by men of another class and rate of pay. I therefore give the following method of analysis of the labor item,

when multiplied by the capacity of the station in k. w. and by the shift hours for the period gives the k. w. hours output for the time considered. I take as the load factor in this station 33.3 per cent. average for the year. You may remember that in the consideration of the fixed charges I gave as the k. w. hours per year 10,500,000, which is 33.3 per cent. of 3,600 k. w. multiplied by 8,760, the shift hours per annum.

It has been shown above that \$1.87 is the average cost of labor to operate the station for one hour, and if we obtain the average k. w. during the hour, which is k. w. hours for that period, a simple division will give the figure for the cost of labor per k. w. hour. The load factor gives the means of obtaining the k. w. hours, and by multiplying 3.6 by 1,000 and 33.3 per cent. gives 12,000 as the average k. w. for the hour, or k. w. hours for that period. Dividing \$1.87, cost of labor to operate the station per hour, by 1,200 gives .157 cents as the cost of labor per k. w. hour. But 3.6, the figure representing the capacity, was used as a multiplier in obtaining both the cost of labor, \$1.87, and 1,200 k. w. hours. It therefore disappears in the division, and the expression for the cost of labor per k. w. hour is made independent of the capacity of the station to that extent. The rule then for obtaining the cost of labor per k. w. hour for any station is to multiply the rate of pay of the men by the number of men per 1,000 k. w. capacity, and divide by the product of the load factor and 1,000.

*Presented at the Boston meeting of the American Street Railway Association.
†Electrical Engineer, Boston Elevated Railroad Co., Boston, Mass.

I have constructed diagram Fig. 1, which gives the cost of labor for all usual rates of pay, load factors and men per 1,000 k.w. This diagram is based on a rate of 27 cents per hour, and there is also given a reduction table, which gives the per cent. to be added or subtracted for other rates than this. To illustrate its use, suppose we have a station whose equipment requires five men per shift per 1,000 k. w. capacity. During a month of high out-

same size and similar equipment. The duration of the test was 45 hours, made under actual conditions of railroad service during the day, and at night the load was kept on the station by means of a water rheostat. I will say here, however, that the test on the steady night load did not show any great gain in efficiency, due to the fact that the day load of the station was steadied by feeding in with others. The average efficiency of transformation i.h.p. to e.h.p. at the

reduction table. This gives the cost of coal per k.w. hour 63 cents, as against .33 for the condensing engine.

There remains to be included in the operating expenses for this station, water, oil, small supplies, repairs, superintendence and general expense, which I have estimated at .093 cent per k.w. hour. The total operating expense foots up to .58 cent, which, added to the fixed charge of .4 cent, makes the total cost power from standard .98 cent, or very nearly 1 cent per k.w. hour.

Before comparing the costs from the various steam plants I will review briefly the circumstances governing the production of power by water.

The application of water power to street railroads has the following points of advantage: In plants operated under any but very low heads the generating machinery may be installed at a less cost than for steam. The fuel expense also disappears, as well as a portion of the cost of repairs. A part of the labor expense will be saved, inasmuch as no engineers, firemen or coal handlers are required.

The main disadvantage in the application of water power to street railroad operation lies in the fact that generally railroad power stations are quite distant from waterfalls, and that it is very expensive to transmit the electrical energy to any considerable distance, the distance of transmission being hundreds of miles for the majority of street railroads. That it may be made more profitable to employ water power when its location is nearby the road and the price of coal is high also, there can be no doubt.

The cost to produce power from water is often compared with the cost to produce from coal on the basis of continuous operation for 24 hours a day. For street railroad service this method gives a false impression, since it implies that the machinery is working at its full capacity for 8,760 hours per annum, or 100 per cent. load factor; as a matter of fact, for street railroad service a load factor of 33 per cent. is high.

To look at this from another point of view, the demand for power for street railroads cannot be increased at will, as it may be in a manufacturing concern. In the latter, if it is found advisable to run night and day at full capacity, instead of 10 hours, there is produced a correspondingly greater amount of the product, be it flour, steel rails or carbide of calcium, and this output is produced at a correspondingly decreased cost per unit. For street railroad service, on the other hand, there has to be installed sufficient machinery to take the peak of the load.

This is usually three times the average, and is only of a few hours' duration each day. If it were necessary or profitable to use this full capacity continuously for other industries it would be possible to do this with very little increase of labor, no increase of fixed charges and the additional expense of producing the greater output would be merely the coal and a slight increase of supplies and repairs. This combination is the feature of the Niagara work.

When the expense of transmission shall have been decreased by the successful employment of higher voltage, it will then become a problem as to whether it will not be profitable to produce power from a steam plant located at a coal mine, coal costing in this case but 80 cents a ton. This would bring the cost of fuel down to .12 cent per k.w. hour, as against .33 cent for standard plant. Further, this expense would only continue for the comparatively small number of hours that the plant would have to be operated for street railroad service. This might be better economy than to pay the fixed charges that would accrue from the expensive development of water powers at possibly much greater distances. It is to be noticed in this connection that the cost of installing the steam station would be considerably less when located at the coal mine, since it would then be unnecessary to equip with the most economical and expensive machines.

Water power produced in various parts of the country varies greatly in its cost. It is reported that the electrical energy so produced costs from \$14 to \$32 per annum per k.w. continuous output. This expense is largely made up of fixed charges, which increase rapidly as the expense of making the necessary improvements is greater. The standard steam plant produces power with \$3 coal for \$29, and with 50 cent coal for \$22 per k.w. per annum, which compare very favorably with the above for water power.

A disadvantage occurring in the use of water power is that in some cases on account of certain periods of low water an auxiliary steam plant has to be kept in reserve, which is, of course, an additional expense. There can be no general rule given that will determine whether it is more advantageous to use water or steam power. Each case must be figured by a competent engineer and decided on its merits.

(To be continued.)

Train Accidents in the United States in August.

COLLISIONS. Rear.

5th, on Pittsburgh, Fort Wayne & Chicago, near Forest, O., a freight train ran into the rear of a preceding freight, badly damaging the engine and five cars. Three trainmen were injured.

6th, on Chicago & Northwestern, at Boone, Ia., a freight train ran over a misplaced switch and into several cars standing on a side track; a number of cars of coal were wrecked and the engine was overturned. The engineman and conductor were injured.

6th, on Pittsburgh, Fort Wayne & Chicago, near Homewood, Pa., a freight train standing at the station was run into at the rear by a following freight, wrecking the caboose. The engine was overturned and 12 cars were badly damaged. Three trainmen were injured. There was a dense fog at the time.

6th, on New York Central & Hudson River, near Little Falls, N. Y., a freight train slowly ascending a grade was run into at the rear by a following empty passenger engine, wrecking the caboose and one car. The freight conductor was slightly injured. The passenger engine had received a clear signal at the entrance of the block.

7th, on Seattle & International, near Arlington, Wash., a passenger train which had been stopped on a trestle in consequence of the obstruction of the track ahead was run into at the rear by a following freight train. The private car of Vice-President La-mont, of the Northern Pacific, was badly damaged. The freight train had followed the passenger too closely from the last station and was running too fast.

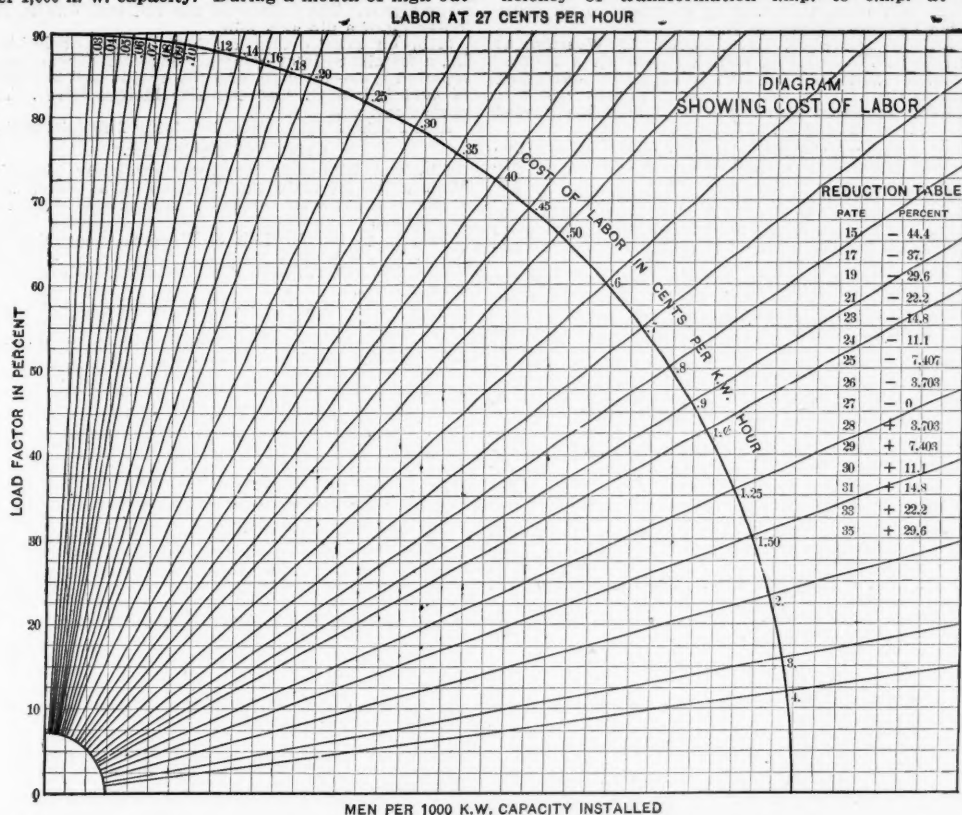


Fig. 1.—Cost of Labor per K. W. Hour of Total Output on Street Railroads.

put it might operate at a 30 per cent. load factor. On the diagram following 5 up to 30 gives cost of labor at 45 cents per k.w. hour. In a lighter month the station might operate at a 15 per cent. load factor. Following 5 up to 15 gives 9 cents, or twice as much for labor per k.w. hour.

To further illustrate the use of this diagram let us consider that the equipment of our standard station is cut into so many units that it required 3.7 men instead of 1.94. Price of labor and load factor being 27 cents and 33.3 per cent, respectively; 3.7 followed on

switchboard was 90 per cent. The steam consumption of the engines was 14.5 lbs. per i.h.p. hour. This record on a later test has been lowered. The boiler evaporation was 9.4 lbs. water lb. of coal from actual conditions. The coal used was New River bituminous. The economy of the station, represented by the coal consumption in pounds per k.w. hour, was 2.3. I have assumed 2.2 for this figure for the standard station.

Reducing price per ton to price per pound and multiplying by 2.2 gives 33 cents as the cost of coal per k.w. hour. As an illustration of what the cost would have

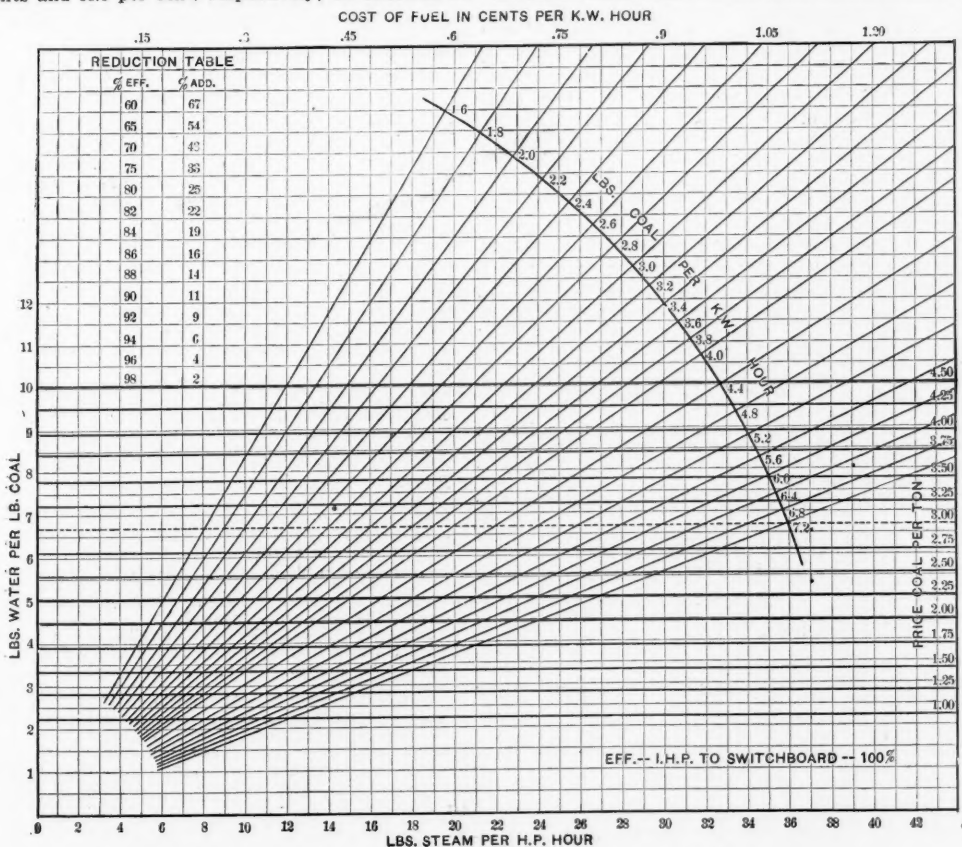


Fig. 2.—Cost of Fuel per K. W. Hour of Total Output of a Street Railroad Power Station.

the diagram up to 33.3 per cent. gives .3 of a cent, as against .157 cent for standard.

The cost of fuel is the next item to be considered in the operating expenses of the standard station. Considering coal as the fuel used its cost per k.w. hour depends on the price per ton and on the efficiency of the station, which is best expressed in pounds coal consumption per k.w. hour. The coal for standard station I have assumed to be clear bituminous, costing \$3 per short ton delivered.

As to the efficiency, I am able to quote from tests in which I was personally engaged on a station of the

been had the engines required more steam, say 26.6 lbs. per i.h.p. hour, as might be the case with a non-condensing engine, referring to the fuel diagram and considering the electrical efficiency, boiler evaporation and price of coal to remain the same, 26.6 to 9.4 lbs. water per pound of coal gives 3.8 lbs. coal per k.w. hour. Following this line down to horizontal \$3 coal line and vertically upward from this point to cost of fuel in cents per k.w. hour we obtain 57 cents, but since it is assumed to be but 90 per cent., 11 per cent. has to be added to this cost, as shown in the

8th, on the Boston & Albany, at Everett, Mass., a freight train switching on the main track was run into at the rear by a following freight and several cars were wrecked. An explosion of naphtha in one of the cars set fire to the wreck and three cars were destroyed. The locomotive and the track were badly damaged by the heat.

8th, on Cleveland, Cincinnati, Chicago & St. Louis, at Marion, O., a freight train descending a grade broke in two and the forward portion was soon after stopped (on account, it is said, of a car jumping the track), and the rear portion of the train ran into it, wrecking 16 cars. Four tramps were injured, one of them fatally.

10th, on St. Louis Southwestern, near Sharpsboro, Mo., a work train collided with some cars standing on the main track and several cars were wrecked. An inspector was killed and five other employees were injured.

10th, on Wabash road, near Cherubusco, Ind., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking eight cars. A man in charge of live stock and a tramp were killed and three trainmen were injured.

17th, 7.30 p. m., on Lake Shore & Michigan Southern, near La Porte, Ind., an eastbound passenger train running at high speed collided with six cars of ice standing on the main track. Three of the freight cars were wrecked and the other three, as also the first car of the passenger train, were considerably damaged. The engineer, two trainmen and three passengers were injured.

19th, 3 a. m., on Boston & Albany, near Chester, Mass., a freight train taking water was run into at the rear by a following freight, wrecking the engine, caboose and two cars of coal. After about six hours' work the wrecking crew cleared the track and was preparing to go home, when another similar collision occurred, and the wrecking train itself was damaged and disabled. Both main tracks were then blocked about 18 hours longer, or 24 hours in all, and passengers had to be carried around in carriages. In the second collision several carloads of hogs were wrecked and about 800 hogs escaped to the woods. The first collision was caused by failure to give or observe signals, and the second by failure to control the speed of train on a steep descending grade.

19th, 3 a. m., on Philadelphia & Reading, near Nicetown, Pa., a freight train ran into the rear of a preceding freight, wrecking two cars. A brakeman was injured.

21st, 7.15 p. m., on New York, New Haven & Hartford, at Sharon, Mass., an eastbound passenger train standing at the station was run into at the rear by a following passenger train, killing four passengers and injuring about 30. The rear car of the foremost train was completely crushed, except the roof, the engine running through it and five feet or more into the next car beyond. The number of passengers in the rear car fortunately was small. The engineer of the approaching train blew his whistle so that the passengers near the doors had a few seconds in which to escape. Some of the evidence concerning the cause of this collision was given in the Railroad Gazette of Sept. 9, p. 654.

22d, night, on Pennsylvania road, at Stockton, N. J., a passenger train ran into an empty engine standing on the main track and both engines were badly damaged. One engineer and one fireman were injured, the latter fatally.

23d, on Atlanta, Knoxville & Northern, near Knoxville, Tenn., a passenger train ran into some freight cars which had been left standing on the main track, making a bad wreck. The engineer and one other trainman were injured fatally and several passengers slightly.

23d, on Baltimore & Potomac, near Bowie, Md., a fast mail train ran into the rear of a preceding freight train, wrecking the caboose, 2 cars of horses and a sleeping car in the freight train. The engine of the mail train was badly damaged and the 2 men upon it were injured. It appears that the rear portion of the freight had been at rest for some time, in consequence of the inability of the engine to haul the whole train up a grade. In the language of one of the trainmen at the wreck, "it looks as if the block signals did not work."

25th, 11 p. m., on Long Island Road, near Farmingdale, N. Y., rear collision of freight trains, wrecking the caboose and badly damaging the engine. The flagman of the foremost train was killed and 3 other trainmen were injured. It is said that they were in the caboose.

30th, 1 a. m., on Southern Pacific, at Roseburg, Ore., an empty engine ran into a freight car standing on the main track, wrecking the car and damaging the engine. The engineer was injured. It is believed that the car had been started out of a side track by the jar of a passing train.

And 23 others on 16 roads, involving 6 passenger and 31 freight and other trains.

Butting.

1st, on Central of Georgia, near Ft. McPherson, Ga., butting collision between a freight train and a train carrying soldiers, badly damaging both engines. One fireman and 1 unknown man were killed and 3 trainmen were injured.

3d, on Cincinnati, Lebanon & Northern, near Mason, O., butting collision between a passenger train and a freight, wrecking both engines and several cars. Two passengers were injured. It is said that the freight was running on the time of the passenger train.

3d, on Great Northern, at Belton, Mont., butting collision of freight trains, badly damaging both engines and 8 cars. A brakeman was killed. It is said that the trains were ordered to meet at Belton and that the eastbound had run some distance beyond the yard limit without sending out a flag.

4th, on Pittsburgh & Western, near Coaldale, Pa., butting collision of freight trains, wrecking both engines and several cars. One engineer was injured.

5th, on Vandalia Line, near Waveland, Ind., butting collision between a northbound passenger and a southbound freight train, badly damaging several cars. One engineer was killed and the other engineer and 1 fireman were injured. Four other trainmen were injured.

13th, 1 a. m., on Baltimore & Ohio, at Mineral Siding, O., butting collision between a westbound passenger and an eastbound freight train, derailing and badly damaging both engines. One or 2 freight cars were wrecked, but the cars in the passenger train were so little injured that the train was able

to continue its journey, though the speed at the time of the collision had been high. One engineer and 1 fireman were injured. There was a dense fog at the time.

15th, on Western Maryland, near St. Paul's, Md., butting collision between a passenger train and a freight, wrecking the engines and several cars in each train. The passenger engineer was killed and 2 other trainmen were injured. It is said that the freight train was running contrary to an order which had been given to it.

16th, on Delaware, Lackawanna & Western, at Denville, N. J., butting collision between a regular passenger and an excursion train, badly damaging both engines. One fireman and 3 passengers were injured. It is said that one of the trains disregarded a signal which was set against it.

18th, 8 p. m., Oregon Short Line, near Fossil, Wyo., butting collision of freight trains, wrecking several cars. One brakeman was injured.

19th, on Chicago & Northwestern, at Beverly, Ia., butting collision between a westbound passenger train, No. 11, and an eastbound freight train. Both engines and 2 cars were badly damaged. One engineer and 1 fireman were injured.

23d, Grand Trunk, near Waterville, Me., butting collision of freight trains, badly damaging both engines and several cars. One fireman was killed and both engineers were injured. It is said that the collision was due to a misunderstanding of telegraphic orders.

24th, at Elmore, Ind., butting collision between a passenger train of the Southern Indiana and one of the Evansville & Indianapolis, on the track connecting the two roads. One of the trains was running backward. One engine fell down a bank. One engineer was killed and 3 other trainmen were injured.

25th, on Atchison, Topeka & Santa Fe, near Alva, Okla., butting collision between a passenger train and a work train, badly damaging both engines. Two passengers and 3 trainmen were seriously injured and 15 other passengers were slightly hurt.

29th, 11 p. m., Kansas City, Pittsburgh & Gulf, at Siloam Springs, Ark., a passenger train ran over a misplaced switch and into the head of a locomotive standing on a side track. Two trainmen and 3 passengers were injured.

31st, 2 a. m., on Rio Grande Western, at Bovina, Col., butting collision between a passenger train and a freight, wrecking both engines, 3 freight cars and the baggage cars.

And 6 others on 6 roads, involving 2 passenger and 10 freight and other trains.

Crossing and Miscellaneous.

2nd, on Pittsburgh, Ft. Wayne & Chicago, near Dunkirk, O., a freight engine which had left part of its train on a grade, and which was run back to get it, crashed against the cars at uncontrollable speed and 2 of the cars were ditched. Three trainmen were injured.

4th, on Philadelphia & Reading, near Gilberton, Pa., an empty switching engine, which was run from the yard to the main track when a freight train was due, collided with the freight train, and, having been reversed and deserted, ran back uncontrolled some distance toward Mahanoy Plane, where it ran into the head of a freight train, damaging both engines and several cars.

4th, on New York, New Haven & Hartford, at South Norwalk, Conn., collision between a passenger train and a freight switching on the main track, badly damaging both engines and several passenger and freight cars. A freight brakeman was killed and the passenger engineer and 5 other employees were injured. Five passengers were slightly injured. The passenger train ran past a signal which was set against it.

12th, on Chicago & Northwestern, near Bay View, Wis., collision between switching freight trains, derailing several cars, which fouled an adjoining track on which a train of empty passenger cars was approaching at full speed. This train ran into the freight wreck and its engine and several of the coaches were damaged.

16th, 1 a. m., on Cleveland Terminal & Valley, at Old Portage, O., several cars of the rear part of a freight train became uncontrollable and ran back down grade into the head of a freight train, wrecking 8 cars of coke and badly damaging the engine. It is said that the cars were cut off by the conductor and backed into a side track and that the brakeman on the caboose, who should have stopped them, was asleep, and this brakeman was killed in the collision. Another person sleeping in the caboose was badly injured.

18th, on Erie road, near Youngstown, O., a freight train collided with several cars of a switching freight train, badly damaging the engine and several cars. The engineer was killed.

21st, on Philadelphia & Reading, at Monocacy, Pa., a north bound freight train broke in two and the forward portion ran some distance before the break was discovered. When the discovery was made the forward portion was set back, but in the meantime a south bound train, failing to notice the absence of tail signals on the north bound, pulled out of a side track and was run into by the returning portion of the north bound train.

23rd, on Flint & Pere Marquette at Port Huron, Mich., collision between a regular passenger and an excursion train, overturning four cars of the latter. Twelve passengers were injured. The cars were well filled and many women were trampled upon in the rush to get out. Both trains were running slowly.

23rd, near Knoxville, Tenn., collision between a passenger train of the Atlanta, Knoxville & Northern and a freight train of the Knoxville & Augusta, at the junction of the two roads. The passenger train was running backward. The engine and three cars were badly damaged. Three trainmen were injured, one of them fatally.

26th, on Cleveland, Cincinnati, Chicago & St. Louis, at Cleveland, O., an excursion train collided with a switching freight train. The baggageman was injured.

And 10 others on 9 roads, involving 2 passenger and 18 freight and other trains.

DERAILMENTS.

Defects of Roadway.

2nd, on Santa Fe Pacific, near St. Joseph, Ariz., a passenger train was derailed by a broken rail, and 3 cars fell into the Little Colorado River. One passenger was killed and 15 were injured, one of them fatally. It is said that the chair car, in falling down the bank of the river, rolled over twice.

8th, on New York, New Haven & Hartford, at Canton Junction, Mass., a fast mail train was derailed at a misplaced movable-point frog, and the engine and first four cars were wrecked. The engineer, fireman and one other employee riding in the cab were killed and 3 mail clerks were injured. The rod actuating the frog had failed; and the signalman, being able to put the lever home, locked the frog in the wrong position, and thus was able to give a clear signal. The failure of the rod was due to the loosening of a pin at a joint.

25th, on Mason City & Fort Dodge, at Lehigh, Ia., a freight train crossing a bridge which was being repaired broke through, and the engine and four cars of coal fell 40 ft. into the Des Moines River. The engineer was injured.

And 2 others on 2 roads, involving 2 freight trains.

Defects of Equipment.

8th, on Chicago & Northwestern, near Kenosha, Wis., a freight train was derailed by a broken axle and seven cars were wrecked. A man stealing a ride was killed.

21st, 11 p. m., Norfolk & Western, near Meadow View, Va., a freight train was derailed by a broken wheel and several cars were wrecked. A brakeman was injured.

28th, Columbus, Sandusky & Hocking, near Sayre, O., the engine of a passenger train was derailed by the breaking of a flange and fell down a bank. The engineer was badly injured.

And 18 others on 13 roads, involving 1 passenger train and 17 freight and other trains.

Negligence in Operating.

3rd, on Pennsylvania road, at Blairsville Intersection, Pa., an excursion passenger train which was being backed into a side track was pushed violently over a bumping post at the end of the track, and one car fell down a bank. Seven passengers were injured.

5th, on Western Maryland, near Edgemont, Md., a freight train descending a grade became uncontrollable in consequence, it is said, of defective air brakes, and the engine and 6 cars were derailed at a point where the track was undergoing repairs. The repairmen had sent out a flag about half a mile, but it was impossible to stop the freight within that distance.

16th, 1 a. m., on Cleveland, Cincinnati, Chicago & St. Louis, near Mattoon, Ill., a freight train was derailed at the derailing switch approaching the crossing of the P. D. & E., and the engine and 2 cars were overturned. The fireman was killed.

22nd, on Detroit & Lima Northern, Lima, O., a freight train was derailed at a derailing switch and the engine was wrecked. The fireman was badly hurt and the engineer slightly.

And 3 others on 3 roads, involving 1 passenger train and 2 freight trains.

Unforeseen Obstructions.

2nd, on Gulf & Interstate, near Fernet, Tex., a freight train was derailed by running over a cow, and 3 cars were ditched. A brakeman was killed.

6th, on St. Joseph & Grand Island, near Hiawatha, Kan., a freight train was derailed by cattle on the track and the engine and 16 cars were ditched. The engineer and conductor were injured.

8th, on New York, New Haven & Hartford, at Providence, R. I., 2 cars of a freight train were derailed by the body of a man who threw himself under the wheels.

10th, on Louisville & Nashville, near Pennington, Va., a passenger train was derailed at a point where the roadbed had been washed by rain, and 2 passenger cars fell down a bank. All of the 20 passengers were injured, 4 of them severely.

And 7 others on 7 roads, involving 7 freight trains.

Unexplained.

1st, on Gulf & Interstate, near Beaumont, Tex., a freight train was derailed and a brakeman was killed.

2nd, on New York Central & Hudson River, at Richland, N. Y., a sleeping car, being switched from one train to another, was derailed and overturned. Two passengers were injured.

3rd, on Louisville & Nashville, at McAdory, Ala., the tender of the locomotive drawing a passenger train was derailed, and with the mail car and first 2 passenger cars, fell down a bank. One passenger was killed and another was fatally injured. One mail clerk and 16 other passengers were also injured. There were about 100 passengers on the train.

4th, on Lake Erie & Western, at Alexandria, Ind., a freight train was derailed and two brakemen were injured.

6th, on Pittsburgh, Bessemer & Lake Erie, near Shenango, Pa., a freight train was derailed and 11 cars were wrecked. A brakeman was injured.

7th, on Great Northern, near Cass Lake, Minn., a work train was derailed and 4 platform cars were wrecked. Two employees were killed and 6 were injured.

13th, on Southern Pacific, near Ellicott, Cal., a freight train was derailed and the engine fell down a high bank. Two freight cars were wrecked. The engineer and fireman were injured.

17th, 1 a. m., on Texas & Pacific, near Fort Worth, Tex., a car in a freight train was derailed, and with 5 others fell down a bank. Two tramps riding in one of the cars were injured.

18th, on Chesapeake & Nashville, near Gallatin, Tenn., a mixed train was derailed and 3 freight cars were overturned. One passenger and 1 brakeman were injured.

28th, on Louisville & Nashville, at New Castle, Ala., a special passenger train carrying soldiers was derailed on a curve and the engine and first 5 cars were ditched. Three soldiers were killed and 15 injured.

31st, on Southern Pacific, at Sims, Cal., a freight train was derailed and the engine and several cars fell down a bank. The fireman was killed and the engineer fatally injured.

31st, on Chicago Great Western, near Hanley, Ia., a freight train was derailed and the engine and 8 cars fell down a bank. A tramp was injured.

And 38 others on 35 roads, involving 9 passenger and 30 freight and other trains.

OTHER ACCIDENTS.

5th, on Atchison, Topeka & Santa Fe, near Emporia, Kan., the engine of a fast mail train was badly damaged by the breaking of a parallel rod, the cab being wrecked. The fireman jumped or fell to the ground and was killed.

11th, on Manhattan Elevated, Ninth avenue line, at Rector street, New York City, the rear car of a passenger train was pushed against a station platform by the premature movement of a facing point switch after the foremost truck of the car had passed over

It. The car was badly damaged and a guard and 1 passenger were injured.
21st, on Pittsburgh, Cincinnati, Chicago & St. Louis, near Speeds, Ind., a car of a passenger train was badly damaged by a loose door of a refrigerator car standing on a side track. One passenger was killed and 15 passengers and an employee were injured.
And 2 others, involving 1 passenger train and 1 freight train.

A summary will be found in another column.

A Reversible Pneumatic Boring Machine.

The Standard Pneumatic Tool Co., Marquette Building, Chicago, has just brought out a new boring machine which is reversible. This tool is shown by the accompanying engraving, weighs but 9 lbs., and will bore holes in wood up to 4 in. in diameter: on account of the reversible feature the bit can be easily withdrawn from the work. The motor is at rest when the handle is in the central position, and runs in



either direction as the handle is turned either to the right or to the left. The handle operates a valve which works in much the same way as a three-way cock in controlling the admission of air to the cylinders.

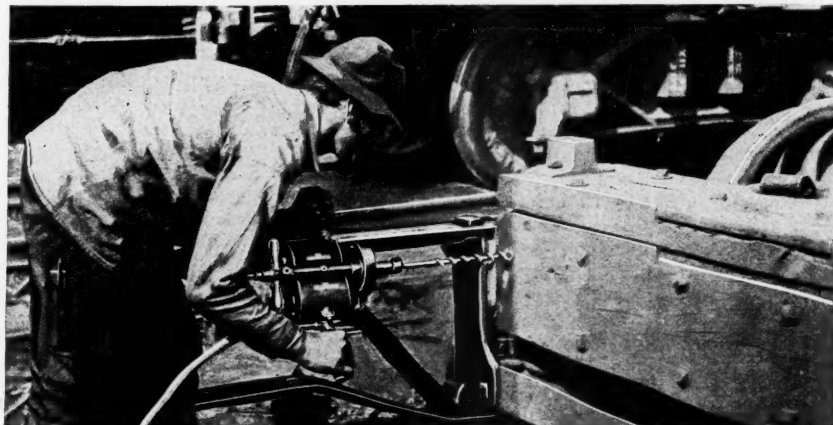
As the motor proper is reversed, changeable gears are not required, as in some of the first machines, while this feature also enables the latest machines to be reversed while running at full speed.

Four single-acting cylinders are used, arranged in pairs, and working on four cranks, set at 90° one with another; the valves are of the piston type. The crank shaft, gears and all parts subject to wear are of tool steel, and are encased so as to run in oil. This tool is also specially adapted for flue cutting and rolling.

The Whitlaw Pneumatic Boring Machine.

Almost all of the important railroad repair yards, as well as the shops, are now piped for compressed air, which, beside other uses, is very convenient in furnishing power for small portable tools. About the first pneumatic tool to be used to any extent in the repair yards was the pneumatic jack, but now painting, boring, drilling and chipping in the best equipped yards is largely done with tools driven by compressed air. Much attention is being given to the design of light, portable tools, and the engraving shows one of the latest, the Whitlaw piston air drill, as applied to truck work, which, on account of its small size, is particularly adapted for drilling and boring in close places. It is now being put on the market by the Chicago Pneumatic Tool Co.

Those who attended the last convention saw this tool under working conditions, and the fact that the makers have since then been about 50 tools behind their orders is pretty good proof that it is meeting with approval. Holes can be bored with it in about one-fourth the time required for hand work. At present this drill is made in but one size, the No. 6, which is suitable for light drilling in iron or steel, and will bore holes in wood up to 4 in. in diameter. It has two cylinders, with piston valves, the cranks being set at 90°, so there are no dead centers, the



The Whitlaw No. 6 Boring Machine.

weight is 9 lbs., and when working, between 8 and 10 lbs. of free air are used per minute.

A slightly larger drill of the same type will shortly be brought out, so arranged that it will be reversible. The reversible drill is intended especially for flue cutting and rolling, but will doubtless be useful for many other operations.

Lead vs. Zinc Paints.

By G. R. Henderson, M. E., Norfolk & Western Ry.

The relative merit of lead and zinc paint has long been a theme of discussion among painters, and in order to determine, if possible, something definite, it was decided to make a series of carefully conducted exposure tests with boards and plates coated with the different paints. The pieces for testing were of tin, galvanized iron, sheet iron, poplar, white pine and yellow pine, and to each two coats of paint were given. The backs were numbered in order to keep a record of the treatment which each had received, and the pieces were then hung up on the south wall of a

shed on the plates were not consulted until after the samples had been criticised and marked either "good, medium, or bad," so as to eliminate, as far as possible, any prejudice which a knowledge of the treatment might cause the committee. The condition of the samples was so varied, that there was no difficulty in classing them as above indicated, some retaining their original lustre, while others were badly cracked and washed off.

Endeavoring to present the results in such a shape that they can readily be grasped by the eye, a chart is attached with blocks or squares shaded to indicate good, bad or medium. The white squares indicate that the paint was still in good condition after one year's exposure; the shaded blocks that the paint was in

1st COAT	LEAD	LEAD	LEAD	ZINC	ZINC	ZINC	Z A L	Z A L	Z A L
2nd COAT	LEAD	ZINC	Z A L	LEAD	ZINC	Z A L	LEAD	ZINC	Z A L
M.F.R.	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C	A B C
TIN									
G. IRON									
S. IRON									
POPLAR									
W. PINE									
Y. PINE									

Diagram Showing Results of Tests of Paints.

shop just below the eaves, where they were allowed to remain for one year, exposed to rain and sun.

The paints used were bought, for this especial purpose, from three makers of reputation, whom we will designate as A, B and C. Each supplied white lead, white zinc and a mixed paint consisting of one-third white zinc and two-thirds white lead. The analyses of the several lots of paint are given below, in order to show the similarity of the materials:

Analysis of White Zinc.

Maker	A	B	C
Pigment	57.80%	58.23%	55.96%
Oil	42.40%	41.42%	44.02%
Water		.35%	.02%
Zinc oxide	99.81%	99.68%	99.72%
Impurities	.19%	.32%	.28%
Specific gravity	.936	.935	.933
Rise with sulphuric acid	100°	102°	101°
Iodine assimilation	161%	159%	159%
Flash test	590°	555°	600°
Loss at 212°	Trace	Trace	Trace
Covering power	Good	Good	Good
Fineness	Good	Good	Good

Analysis of White Lead.

Maker	A	B	C
Pigment	70.20%	69.20%	68.53%
Oil	29.60%	29.78%	31.42%
Water	.20%	.02%	.05%
Lead carbonate	67.2%	70.52%	71.08%
Lead hydrate	32.69%	28.93%	28.85%
Impurities	.11%	.42%	.03%
Specific gravity	.936	.935	.933
Rise with sulphuric acid	100°	102°	101°
Iodine assimilation	161%	159%	159%
Flash test	590°	555°	600°
Loss at 212°	Trace	Trace	Trace
Covering power	Fair	Good	Good
Fineness	Fair	Good	Good

Analysis of 1/2 White Zinc and 1/2 White Lead.

Maker	A	B	C
Pigment	64.20%	63.18%	63.29%
Oil	35.62%	36.71%	36.60%
Water	.18%	.11%	.11%
Lead carbonate	50.84%	46.54%	46.80%
Lead hydrate	21.58%	18.43%	18.31%
Zinc oxide	26.49%	34.88%	34.76%
Impurities	.09%	.15%	.13%
Specific gravity	.936	.935	.933
Rise with sulphuric acid	100°	102°	101°
Iodine assimilation	161%	159%	159%
Flash test	590°	555°	600°
Covering power	Good	Good	Good
Fineness	Good	Good	Good

In all, 162 pieces were exposed, a piece of each material being coated with paint made by A, B, or C exclusively, and having either first or second coat of

medium condition, it having lost its lustre and presenting the appearance of whitewash; and the black indicates that it was in a very bad condition, either being badly cracked or having come off in flakes from the painted surface. The nine methods of coating are indicated by the heading of the columns, and these were all performed by the same man, so that they may be considered as having had practically the same careful treatment throughout.

Analyzing the chart, we find that the paints which recommend themselves for the different materials are as follows:

Tin.—The best results were obtained with first coat white lead and second coat white zinc. It will be noticed throughout that the second coating of zinc gave generally the best results, and the second coating of lead the worst.

Galvanized Iron.—The same remarks apply to galvanized iron that were given for tin.

Sheet Iron.—The mixture of one-third white zinc and two-thirds white lead, for both coats, gave the best results on this material, and it will be noticed that in general the zinc paints gave better results than the lead paints.

Poplar.—The second coats of zinc showed up well on poplar, no matter whether the priming coats were white lead or white zinc, or mixed lead and zinc. The lead second coating showed up the worst on this material, but in each case where the second coat was of zinc, totally or partially, the paint was in a perfect condition.

White Pine.—The remarks made relating to poplar apply to white pine also.

Yellow Pine.—This material seems to be difficult to properly treat with paints; the best results were obtained with the first coat of lead, and the second coat of lead and zinc mixed. Where the first coat was of lead and zinc mixed, or entirely of zinc, the results were poor throughout, which seems to indicate that as a general thing, the lead is better for priming on this material.

Conclusions.—The lead priming and zinc coating is generally good for tin, galvanized iron, poplar and white pine.

Sheet iron showed up best with both coats of mixed paints.

Yellow pine appeared best with the first coat of lead and the second coat of lead and zinc mixed.

Comparing the materials which were painted, we find that, generally, poplar retains the paint better than white pine, and would, therefore, be preferred for siding on buildings, etc. Yellow pine seems to be the worst of all for this purpose.

Black iron, as a whole, seems to retain the paint better than either tin or galvanized iron.

A process for treating ties, brought out by an architect named Hasselmann, in Munich, has been tried on the Bavarian State Railroads. This process is designed to produce a chemical union of the substance of the wood itself and the preservative. The treatment consists of a double baking of the wood and treatment with oil of vitriol and sulphate of iron, and afterward in a bath of chloride of lime, to which milk of lime has been added, at a temperature of from 100° to 125° C., and at a pressure of about two and one-half atmospheres. The first baking destroys the germs of fermentation and induces the mechanical union of the preservatives with the fibres of the wood, and the second hardens the wood and so changes its character that it remains dry even when laid in damp places. The whole process takes about six hours, and costs for an ordinary tie about two cents. Microscopic examination shows that the antiseptic substance had penetrated completely through the cell walls, while the cell cavities were empty; also the hardening of the wood is quite remarkable, and adds considerably to its durability, especially in moist situations.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

Coverings for Locomotive Boilers.

The most elaborate tests of non-heat conducting coverings for steam pipes and boilers which have been made recently are those which are now being conducted by Mr. Charles L. Norton, of the Massachusetts Institute of Technology, and although the investigations are carried on in a laboratory room in which all atmospheric disturbances are reduced to a minimum, and with the use of stationary pipes, and without special regard to the application of the coverings to locomotive boilers, nevertheless the work is so scientific that deductions worth the attention of railroad men can be made from the results.

A committee of the Master Mechanics' Association made some tests of boiler coverings, and reported the results at the 1898 meeting of the Association. These tests also were made with covered pipe and, partly because the committee did not explain fully the method of making the tests and partly because in several instances the results were quite different from results obtained from other similar researches, the value of the committee's report has been questioned.

From the tests of coverings on pipe referred to above, and from other similar tests, efforts have been made to draw conclusions which shall be applicable to locomotive boilers. The results from such tests have been so uniform in several respects that in these respects at least they may be accepted very safely as applying equally well to coverings on locomotive boilers, regardless of the differences between the atmospheric conditions under which such tests have been made, and those to which the locomotive boiler is subjected. Those who prefer to be guided by road tests of coverings will hope for the early publication of the results of the very elaborate road tests which were made recently on the Chicago & Northwestern Railway, reference to which was made in the Railroad Gazette, Aug. 12, 1898, page 581.

It is to be expected that coverings so applied to boilers or pipe that there is a possibility of leaving openings through which currents of air may circulate will give better results when not exposed to atmospheric disturbances. Questions arising from such conditions can best be decided by road tests but the deductions given below are of such a nature that these conditions will not affect the results materially, except as where explained.

All tests of coverings, the reports of which are accessible, show that it pays to cover boilers and steam pipes with material which does not transmit heat readily. It may be considered unnecessary to make such a declaration, but there are those who believe, or who pretend to believe, that it does not pay to cover even locomotive boilers, and there are only a few who have shown their appreciation of the fact that not only all surfaces of locomotive boilers which it is possible to cover, but also all ex-

posed steam passages leading to the cylinders and all steam pipes leading to pumps, injectors and to other steam-using attachments should be well protected. Prof. Norton found that by covering pipe not subjected to draughts of air a saving of about \$37.50 per 100 square feet per year would result, the cost of coal taken at \$4 a ton, which is high for locomotive fuel generally. This represents a saving of about 80 per cent. of the heat that would be lost from the bare pipe, and while the percentages would be the same for locomotive boilers, the total amounts would be much greater.

Another very important fact which has been established by the uniformity of results of laboratory tests, and which, it is but fair to suppose, will be substantiated by the road tests, is that with the thickness of coverings now generally used on locomotive boilers, from 1¼ to 1¾ inches, there is only a small difference in the total saving produced by the best covering and by the poorest, providing, of course, there are no air currents through the covering or between it and the boiler. If such air currents are allowed, fair returns will not be obtained from the coverings, of whatever kind. The above fact will no doubt be quite a surprise to many, but it is very strongly emphasized by Prof. Norton's data, which show that in ten years the net saving produced by the best covering above the saving produced by the poorest tested by him, may be \$46 per 100 square feet, taking coal at \$4 per ton; this amount would be only \$23 with coal at \$2 per ton, and this may be a little above the average cost for locomotive fuel. The reason for this small difference is that commercially it is quite impossible to save more than about 80 per cent. of the heat loss from bare surfaces; a greater percentage can be saved, but the cost for doing it would be greater than the cost of the heat lost. The rate of saving for each ¼ or ½ inch in thickness above ½ or ¾ inch in thickness decreases very fast, and although the first ½ inch in thickness of the best covering saves considerably more than does the same thickness of the poorest, yet the proportional rate of decrease in efficiency of the additional thickness of the poorest is not so rapid as is the proportional rate of decrease in efficiency of the additional thickness of the best covering; when thicknesses of 1¼ to 1¾ inches are considered, the poorest and best coverings are on a more equal footing, so far as efficiency is concerned, than they would be with coverings ½ inch thick. There is for each kind of covering a thickness which will produce the most economical results possible for each covering.

The determination of these thicknesses should be of greatest importance to those who are making coverings, because the more costly coverings, which are supposed to be the more efficient, applied in less thickness might give better net results than the cheaper coverings applied in greater thickness, even though the amount of heat saved in the former case might be less than in the latter. In other words, the additional heat saved by making the more costly coverings as thick as the cheaper ones might cost less than the additional thickness of the covering. On the other hand, the cost of material necessary to save the same amount of heat with the cheaper coverings as with the more costly ones, might be less than the cost of the additional heat saved, and in such case the cheaper material would have a higher commercial efficiency, regardless of the increase in thickness. We do not know of any such determinations having been made.

There should be considered, in calculating the cost of locomotive boiler coverings, the first cost of material and the cost of applying the first time, the cost of removing the first and second or more times, and the cost of applying each time after removal from the boiler. The last item will be most difficult to determine, because the amount of new material necessary to use with the old will vary with the care used in removal of the old and with the conditions of the material when removal becomes necessary.

The report of the committee of the Master Mechanics' Association should, for several reasons, be interpreted with much care. Wood lagging, which, it is well known, deteriorates fast after being applied, is reported as giving results equal to the best coverings tested; also, the cement coverings, as is well known, are quite inefficient when first applied and before they are thoroughly dried, but it is quite evident that such coverings were tested while moist. Prof. Norton says in his report: "The question of the ability of a pipe covering to withstand the action of heat for a prolonged period without being destroyed or rendered less efficient is of vital importance." Add to this that, for locomotive boilers, it is equally important that the covering shall be applied in such a manner as to prevent it rattling from position, and then let us emphasize both declarations as strongly

as possible, and then bear these conditions in mind when selecting covering for locomotive boilers.

The rate of transfer of heat through air is slower than through any substance which is available for boiler covering; therefore a covering of perfectly quiet air would be one of the best possible; but the rate of transfer from a substance to air is even slower than the rate through air; therefore the greater number of such obstructions interposed the better the heat insulation, but there must be no air currents. For these reasons, "air cell" coverings have received much attention and are receiving more attention now. It is also quite important, if possible, that the covering does not touch the boiler, provided currents of air between the boiler and covering can be effectually prevented.

August Accidents.

Our record of train accidents in August, given in this number, includes 83 collisions, 94 derailments and five other accidents, a total of 182 accidents, in which 43 persons were killed and 251 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS.	Rear.	But-ting.	Cross-ing and other.	Total.
Trains breaking in two.....	11	0	0	11
Misplaced switch.....	2	2	1	5
Failure to give or observe signal... 9	2	3	14	
Mistake in giving or understanding orders.....	0	5	0	5
Miscellaneous.....	10	3	5	18
Unexplained.....	10	9	11	30
Total.....	42	21	20	83

DERAILMENTS.

Broken rail.....	1	Misplaced switch.....	1
Loose or spread rail.....	1	Runaway train.....	2
Defective bridge.....	1	Bad switching.....	2
Defective switch.....	1	Derailing switch.....	2
Soft track.....	1	Animals on track.....	3
Broken wheel.....	3	Washout.....	3
Broken axle.....	8	Malicious obstruction.....	1
Broken truck.....	3	Accidental obstruction.....	4
Fallen brakebeam.....	2	Unexplained.....	50
Failure of drawbar.....	2		
Broken car.....	2		
Burst brake-hose.....	1		
Total.....			94

OTHER ACCIDENTS.

Broken side rod.....	1
Various breakages of rolling stock.....	3
Other causes.....	1
Total.....	5

Total number of accidents..... 182

A general classification shows:

	Colli-sions.	Derail-ments.	Other acci-d's.	Total.	P. c.
Defects of road.....	0	5	0	5	3
Defects of equipment.....	11	21	4	36	20
Negligence in operating.....	42	7	1	50	26
Unforeseen obstructions.....	0	11	0	11	5
Unexplained.....	30	50	0	80	46
Total.....	83	94	5	182	100

The number of trains involved is as follows:

	Colli-sions.	Derail-ments.	Other acci-d's.	Total.
Passenger.....	35	20	3	58
Freight and other.....	121	75	2	198
Total.....	156	95	5	256

The casualties may be divided as follows:

	Colli-sions.	Derail-ments.	Other acci-d's.	Total.
Killed:				
Employees.....	15	10	1	26
Passengers.....	5	7	1	13
Others.....	3	1	0	4
Total.....	23	18	2	43

	Colli-sions.	Derail-ments.	Other acci-d's.	Total.
Injured:				
Employees.....	63	23	2	88
Passengers.....	63	73	10	146
Others.....	3	3	0	6
Total.....	134	99	12	245

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	2	14	3	4
Defects of equipment.....	1	15	1	3
Negligence in operating.....	5	71	16	71
Unforeseen obstructions and maliciousness.....	0	50	1	2
Unexplained.....	5	32	5	13
Total.....	13	152	26	93

Twenty-nine accidents caused the death of one or more persons each, and 33 caused injury but not death, leaving 120 (66 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with August of the previous five years shows:

	1898.	1897.	1896.	1895.	1894.	1893.
Collisions.....	83	64	48	53	25	50
Derailments.....	94	61	54	71	89	90
Other accidents.....	5	3	2	8	9	7
Total accidents.....	182	128	104	132	150	147
Employees killed.....	26	17	39	39	25	22
Others killed.....	17	15	18	19	25	38
Employees injured.....	93	55	53	41	94	67
Others injured.....	158	85	87	99	42	95
Passenger trains involved.....	58	36	35	48	44	55

Average per day:

	1898.	1897.	1896.	1895.	1894.	1893.
Accidents.....	5.87	4.13	3.36	4.26	4.84	4.74
Killed.....	1.39	1.03	1.52	1.58	1.61	2.13
Injured.....	5.10	4.52	4.52	4.52	4.39	4.94

Average per accident:

	1898.	1897.	1896.	1895.	1894.	1893.
Killed.....	0.24	0.25	0.45	0.37	0.33	0.44
Injured.....	1.38	1.10	1.34	1.06	0.90	1.04

Passengers were killed in six accidents in August,

a larger number of accidents fatal to passengers than we have had to report since January, 1894; and the number of passengers killed or fatally injured, 13, is larger than has been reported since that time, except when there was a great disaster.

In the month referred to there was a rear collision at Hackensack, N. J., killing 13. For the next 29 months the records were comparatively light, and then came Atlantic City and Logan, both in the same month, July, 1896, killing 75. Since then Gurnee, Ala. (December, '96), Newcastle, Col. (September, '97), and Garrison, N. Y. (October, '97), have been the only cases notable for the number of passengers killed. The six accidents referred to in the present report are the following: 2d, St. Joseph, Ariz.; 3d, McAdory, Ala.; 10th, Cherubusco, Ind.; 21st, Speed's, Ind.; 21st, Sharon, Mass.; 28th, New Castle, Ala. The Sharon collision has been inquired into by the Massachusetts State Railroad Commissioners, but no report has yet been issued. Some reflections on one of the lessons of this collision were published last week.

The train wrecked at New Castle, Ala., carried the Sixty-ninth Regiment of New York Volunteers, and the victims were soldiers. It was claimed, with a good show of plausibility, that the train was running excessively fast on a curve, and that this reckless running was the cause of the derailment; and the soldiers threatened the life of the engineer; but it is also said on good evidence that the speed was not over 35 miles an hour. Another case in which a military train was wrecked was that at Fort McPherson, Ga., on the 21st. Other serious accidents in the list are Canton Junction, Mass. (8th); Port Huron, Mich. (23d), and Rector street, New York City (11th).

A variety of unclassified railroad accidents occurred in August. At Prescott, Ariz., on the 17th, a locomotive of the Santa Fe, Prescott & Phoenix, exploded in the round house, killing two men. At Truckee, Cal., a dozen freight cars and some buildings were burned up, and passenger trains were delayed several hours, by a fire due to the explosion of naphtha in a freight car, the fire being caused by a cigarette which was lighted by a tramp. On the 11th, at Gila Bend, Ariz., a passenger train of the Southern Pacific had to be stopped on account of a sand storm, which terrified the passengers; empty freight cars were overturned by the wind and a tank house was blown down. Near McClure, Ill., on the 11th, three Italian laborers unloading rails were killed by the overturning of a car. It is said that the accident was caused by completely unloading one side of the car, while leaving the other side untouched.

Near Bondville, Mass., on the 27th, six persons in a carriage were killed by being struck by a train at a grade crossing; near Petersburg, Va., on the 24th, and near Frankfort, Ind., on the 12th, there were similar accidents, in each of which three persons were killed.

A press dispatch from Vancouver, B. C., Aug. 14, states that a passenger train of the Canadian Pacific, running rapidly, was struck by lightning, the bolt entering the car at a window and going out through the floor. From Victoria, B. C., it was reported, Aug. 17, that a work train on the Union Colliery railroad broke through a trestle bridge and fell into Trent River; six persons were killed.

The number of electric car accidents reported in the newspapers during August was 13, in which three persons were killed and 53 injured. One of these, the failure of a bridge near Utica on Aug. 7, has already been reported in the Railroad Gazette. The one other accident fatal to passengers was at Pittsburgh on the 24th, where a car was struck by lightning and two passengers were killed. In this case four passengers were injured by jumping off the car. There was one case of a freight train running into a street car, three butting collisions due to misunderstanding of orders, and one car was partially wrecked by a malicious explosion of dynamite.

Annual Reports.

Missouri, Kansas & Texas.—The year ending June 30 was the most prosperous enjoyed by this company since its reorganization. Increased tonnage and freight revenue and reduced cost of operation combined to give the company considerably the highest gross and net receipts it has yet earned. The surplus was equal to 3.65 per cent. on the \$13,000,000 of preferred stock, and was double the best previous figure reported, which was in 1895, when the company was not paying full interest on its second mortgage bonds.

The income account for 1898 and 1897 is given below:

	1898.	1897.	Inc. or Dec.
Passenger earnings.....	\$1,919,556	\$1,818,188	I. \$101,368
Freight earnings	9,559,000	9,107,297	I. 451,703
Total gross	12,047,237	11,478,315	I. 568,922
Expenses and taxes.....	8,182,388	8,337,401	D. 155,013
Net earnings	\$3,864,849	\$3,140,914	I. \$723,935
Int. and rentals	3,427,170	3,427,267	D. 97
Balance	\$437,679 (def.)	\$286,353	I. 151,326
Other income	69,090	137,000	I. 67,910
Less adjustments	32,013	.....	I. 32,013
Surplus	\$474,756 (def.)	\$149,353	I. 624,109

The ratio of expenses was reduced from 73 per cent. to 68. This was accomplished by reductions in both maintenance items and in the cost of conducting

transportation. The latter is a rather noteworthy circumstance, because both passenger and freight traffic largely increased over the totals for the previous year. The classification of expenses in 1898 and the changes from last year are brought out below:

	1898.	Inc. or Dec.
Conducting transportation	\$5,019,371	D. \$104,012
Maintenance of way.....	1,324,052	D. 252,529
Maintenance of equipment.....	909,506	I. 120,292
General expenses	665,300	I. 63,956
Total	\$7,909,228	D. \$172,293

The company carried in 1898 3,569,000 tons of freight, or 331,919 more than in 1897, an increase of 10.2 per cent.; the average distance carried decreased from 314 to 292 miles, so that the increase in ton-miles was only 2.2 per cent. This larger traffic, however, was moved with a decrease of nearly 7 per cent. in freight train miles run. The passenger statistics make an even better showing. The number of passengers carried increased 8 per cent., and the passenger miles 89,525 thousands, or 14 per cent., but fewer passenger train miles were run by 544,000, or 17 per cent. Loaded freight car mileage was 67.7 per cent. of the total in 1898, against 63 per cent. last year. The average mileage of loaded cars per train increased 63, while that of empties decreased 92 miles.

The company is able to report an improvement in its ton-mile rate. This was 8.95 mills in 1897, and is now 9.18 mills. It is still lower than the average of Western roads.

The improvement work of the year has included the building of 19 miles of side tracks and ballasting of 38 miles of road. This work is now in progress on 57 additional miles; 117 miles were relaid with heavier rails, the shops at Sedalia were completed and half a dozen stations rebuilt. The funds for betterments are provided by the sale of securities, and \$695,000 still remains available in this account. The net earnings have permitted the payment of \$56,899 to close the car trusts and to reduce the outstanding equipment notes to \$151,517.

Long Island.—The annual report for the year ending June 30 shows a considerable increase in gross earnings, the largest part of which was absorbed by the extensive improvements which have been in progress since the present management assumed control of the property. The increase in gross earnings was \$378,328, of which \$180,117 was due to freight traffic and \$167,564 to passenger. The gain in the former was equal to 15½ per cent. and in the latter to 7.6 per cent. The increase in total gross earnings was equal to 9.56 per cent., in expenses to 9½ per cent., and in net earnings to 9.6 per cent. The principal items of the revenue account for 1898 and 1897 follow:

	1898.	1897.	Inc.
Passenger earnings.....	\$2,361,219	\$2,193,654	\$167,565
Freight earnings	1,348,081	1,167,963	180,117
Total gross	4,333,194	3,954,866	378,328
Oper. exp. and taxes.....	3,195,238	2,947,994	247,244
Net earnings	\$1,137,956	\$1,006,872	\$131,084
Other income	129,869	114,485	15,384
Total income	\$1,267,825	\$1,121,717	\$146,108
Fixed charges	1,023,950	1,019,512	4,438
Surplus	\$243,875	\$102,205	\$141,670

Passenger receipts were 54.5 per cent. of the total in 1898 and 55.5 in 1897.

The surplus will be used for betterments. There were increases in each class of expenses in 1898 except general expenses. The total charges to capital account for additions and betterments were \$233,845, of which the largest items were \$92,727 for 20 new passenger cars, \$70,318 on account of 15 new locomotives, and \$48,400 for completing an incline connection with the Brooklyn Elevated. In connection with this road, the company ran during the summer through trains from Brooklyn terminals to Rockaway and Jamaica, as well as to Coney Island. The importance of this elevated connection to the Long Island road is that it is one step in the complex problem of a better connection between the Long Island towns and lower Manhattan Island.

The competition of the electric surface railroads has become a serious matter on some divisions, especially those reaching the great seaside summer resorts near New York. In other parts of its territory, these lines are being used to reach towns off its road, and the policy of building short electric feeders to the steam road will be continued wherever advisable.

President Baldwin says: "The policy of the directors has been to improve the physical condition of the property, and to provide train service even beyond the present needs of the public, in order to invite an increased traffic in the future. With twelve separate branches in operation, each demanding through express service to the terminal, the problem is difficult, but it has been met in a generous spirit, and to the general satisfaction of the public. The increased passenger train mileage has cost fully \$150,000, and the indications are that it will be wise to continue to give the largely increased service."

Cleveland, Cincinnati, Chicago & St. Louis.—This company very largely increased its traffic and its gross revenues in the year ending June 30, but nearly all the gain in receipts was used up in

increased expenses, mostly for maintenance and repairs, which two accounts absorbed \$754,000, or over two-thirds of the total increase. Although the tonnage moved was much greater, the cost of "conducting transportation" was less than \$300,000 above the 1897 total. The comparisons of the revenue statements of the last two years follow:

	1898.	1897.	Inc.
Gross earnings	\$14,320,094	\$13,117,111	\$1,202,983
Oper. exp. and taxes.....	10,968,368	9,864,664	1,103,704
Net earnings	\$3,351,726	\$3,252,447	\$99,279
Interest and rentals.....	2,905,024	2,883,926	21,098
Balance	\$446,702	\$368,521	\$78,181
Other receipts	35,189	.....	35,189
Total income	\$481,891	\$368,521	\$113,370
Dividends	375,000	375,000	.....
Surplus	\$106,891 (Def.)	\$6,479	\$113,370
Charges written off.....	40,214	.....	40,214

The gross earnings reported above were higher than in any of the last ten years, except in 1893, in which the World's Fair traffic brought the total up to \$14,669,100.

The increase in tonnage carried was equal to 17.1 per cent., and the ton-miles gained 27 per cent. Train loads were larger, and the freight-train miles increased only 11 per cent. This left freight-train mile earnings unchanged, although the ton-mile rate fell off over half a mill. The more important statistics follow:

	1898.	1897.	Inc.
Tons carried	9,630,159	8,223,347	1,406,812
Tons, one mile.....	1,696,221,146	1,343,484,916	352,736,230
Freight train miles.....	6,092,784	5,442,063	650,721
Ton mile rate, cents.....	5.45	6.14	.....
Passengers carried	5,093,978	4,937,250	156,728
Passenger miles	200,998,657	186,657,170	14,341,487
Pass. train miles.....	4,808,764	4,922,582	.....
Pass. mile rate.....	c 1.915	c 1.964	.....
Pass. tr. mile earn.....	c 80.06	c 74.45	c 5.61

The largest change in the expense account was the increase of \$551,475 in maintenance of equipment. This is explained by larger car and locomotive repairs, and by the cost of new equipment. The charges in 1898 for new rolling stock included \$326,000 for new freight cars, \$145,420 for 15 engines, and \$43,000 for seven new passenger cars. The total cost of this equipment was not, however, included in last year's expenses; the greater part is carried in the balance sheet in "New Equipment account," which is charged with \$417,894. This is payable monthly over a period of three years. Other improvement expenses included \$56,577 for air brakes and couplers, \$96,622 for 29 miles of new side tracks and new yards at Greensburg, Ind., and \$36,590 for new stores on the viaduct at Columbus, O., required by the contract with the city.

The company paid three quarterly dividends of 1¼ per cent. on the preferred stock, having resumed their payment after suspending two payments in 1897.

The route between Liverpool and Manchester, the classic ground of experiments in methods of carriage, to which the world already owes the lessons taught by the Bridgewater Canal, the Liverpool & Manchester Railway and the Manchester Ship Canal, seems likely to give us ere long a fourth object lesson; for the trade of Liverpool is not quite so prosperous or so profitable as it used to be, and the Liverpool men of business think that the main reason is the cost of freight service. Having failed to get what they regard as adequate concessions from the existing railroad companies, they have half determined to provide a new means of transport for themselves. Out of a large number of schemes put before it, the Chamber of Commerce appears to have seriously considered three. It rejected a scheme according to which road wagons or drays, known in Liverpool as "lurries," would be joined together into trains and hauled to Manchester by locomotives on tramways—or rather plate ways, for the flange would be on the rail—laid along the roads. It rejected a second and more feasible scheme, according to which the lurries would be mounted outside Liverpool astride of the trucks of a narrow gauge railroad, dismounted at Manchester, and then hauled by horses to their final destination in a particular warehouse. But it appears to have generally approved a scheme for a new railroad of normal gauge, for freight only, which should be built, with capital guaranteed by the Mersey Dock Board and the Liverpool Corporation, on its own land, across country, but which should be allowed to work its trucks through the streets, reconstructed for the purpose, in the great towns at either end. How such a scheme is to be carried out for £1,600,000, why Manchester should lend the use of its streets to a new competitor with its own ship canal, and why, if Liverpool corporation trains or trucks can be worked through the streets the trains or trucks of the existing railroads should not use them also, so avoiding the heavy terminal expenses for loading and unloading at either end—all these are questions to which the Liverpool Chamber of Commerce may possibly know an answer. But that answer is not obvious to the ordinary observer.

A German writer says that on the railroads in his country he finds most things "forbidden," unless they are "strictly forbidden" or "most strictly forbidden." On the walls and windows of a single dining car he found no less than 39 such prohibitions. Twice smoking was forbidden; four times it was forbidden



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Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

Coverings for Locomotive Boilers.

The most elaborate tests of non-heat conducting coverings for steam pipes and boilers which have been made recently are those which are now being conducted by Mr. Charles L. Norton, of the Massachusetts Institute of Technology, and although the investigations are carried on in a laboratory room in which all atmospheric disturbances are reduced to a minimum, and with the use of stationary pipes, and without special regard to the application of the coverings to locomotive boilers, nevertheless the work is so scientific that deductions worth the attention of railroad men can be made from the results.

A committee of the Master Mechanics' Association made some tests of boiler coverings, and reported the results at the 1898 meeting of the Association. These tests also were made with covered pipe and, partly because the committee did not explain fully the method of making the tests and partly because in several instances the results were quite different from results obtained from other similar researches, the value of the committee's report has been questioned.

From the tests of coverings on pipe referred to above, and from other similar tests, efforts have been made to draw conclusions which shall be applicable to locomotive boilers. The results from such tests have been so uniform in several respects that in these respects at least they may be accepted very safely as applying equally well to coverings on locomotive boilers, regardless of the differences between the atmospheric conditions under which such tests have been made, and those to which the locomotive boiler is subjected. Those who prefer to be guided by road tests of coverings will hope for the early publication of the results of the very elaborate road tests which were made recently on the Chicago & Northwestern Railway, reference to which was made in the Railroad Gazette, Aug. 12, 1898, page 581.

It is to be expected that coverings so applied to boilers or pipe that there is a possibility of leaving openings through which currents of air may circulate will give better results when not exposed to atmospheric disturbances. Questions arising from such conditions can best be decided by road tests but the deductions given below are of such a nature that these conditions will not affect the results materially, except as where explained.

All tests of coverings, the reports of which are accessible, show that it pays to cover boilers and steam pipes with material which does not transmit heat readily. It may be considered unnecessary to make such a declaration, but there are those who believe, or who pretend to believe, that it does not pay to cover even locomotive boilers, and there are only a few who have shown their appreciation of the fact that not only all surfaces of locomotive boilers which it is possible to cover, but also all ex-

posed steam passages leading to the cylinders and all steam pipes leading to pumps, injectors and to other steam-using attachments should be well protected. Prof. Norton found that by covering pipe not subjected to draughts of air a saving of about \$37.50 per 100 square feet per year would result, the cost of coal taken at \$4 a ton, which is high for locomotive fuel generally. This represents a saving of about 80 per cent. of the heat that would be lost from the bare pipe, and while the percentages would be the same for locomotive boilers, the total amounts would be much greater.

Another very important fact which has been established by the uniformity of results of laboratory tests, and which, it is but fair to suppose, will be substantiated by the road tests, is that with the thickness of coverings now generally used on locomotive boilers, from $1\frac{1}{4}$ to $1\frac{3}{4}$ inches, there is only a small difference in the total saving produced by the best covering and by the poorest, providing, of course, there are no air currents through the covering or between it and the boiler. If such air currents are allowed, fair returns will not be obtained from the coverings, of whatever kind. The above fact will no doubt be quite a surprise to many, but it is very strongly emphasized by Prof. Norton's data, which show that in ten years the net saving produced by the best covering above the saving produced by the poorest tested by him, may be \$46 per 100 square feet, taking coal at \$4 per ton; this amount would be only \$23 with coal at \$2 per ton, and this may be a little above the average cost for locomotive fuel. The reason for this small difference is that commercially it is quite impossible to save more than about 80 per cent. of the heat loss from bare surfaces; a greater percentage can be saved, but the cost for doing it would be greater than the cost of the heat lost. The rate of saving for each $\frac{1}{4}$ or $\frac{1}{2}$ inch in thickness above $\frac{1}{2}$ or $\frac{3}{4}$ inch in thickness decreases very fast, and although the first $\frac{1}{2}$ inch in thickness of the best covering saves considerably more than does the same thickness of the poorest, yet the proportional rate of decrease in efficiency of the additional thickness of the poorest is not so rapid as is the proportional rate of decrease in efficiency of the additional thickness of the best covering; when thicknesses of $1\frac{1}{4}$ to $1\frac{3}{4}$ inches are considered, the poorest and best coverings are on a more equal footing, so far as efficiency is concerned, than they would be with coverings $\frac{1}{2}$ inch thick. There is for each kind of covering a thickness which will produce the most economical results possible for each covering. The determination of these thicknesses should be of greatest importance to those who are making coverings, because the more costly coverings, which are supposed to be the more efficient, applied in less thickness might give better net results than the cheaper coverings applied in greater thickness, even though the amount of heat saved in the former case might be less than in the latter. In other words, the additional heat saved by making the more costly coverings as thick as the cheaper ones might cost less than the additional thickness of the covering. On the other hand, the cost of material necessary to save the same amount of heat with the cheaper coverings as with the more costly ones, might be less than the cost of the additional heat saved, and in such case the cheaper material would have a higher commercial efficiency, regardless of the increase in thickness. We do not know of any such determinations having been made.

There should be considered, in calculating the cost of locomotive boiler coverings, the first cost of material and the cost of applying the first time, the cost of removing the first and second or more times, and the cost of applying each time after removal from the boiler. The last item will be most difficult to determine, because the amount of new material necessary to use with the old will vary with the care used in removal of the old and with the conditions of the material when removal becomes necessary.

The report of the committee of the Master Mechanics' Association should, for several reasons, be interpreted with much care. Wood lagging, which, it is well known, deteriorates fast after being applied, is reported as giving results equal to the best coverings tested; also, the cement coverings, as is well known, are quite inefficient when first applied and before they are thoroughly dried, but it is quite evident that such coverings were tested while moist. Prof. Norton says in his report: "The question of the ability of a pipe covering to withstand the action of heat for a prolonged period without being destroyed or rendered less efficient is of vital importance." Add to this that, for locomotive boilers, it is equally important that the covering shall be applied in such a manner as to prevent it rattling from position, and then let us emphasize both declarations as strongly

as possible, and then bear these conditions in mind when selecting covering for locomotive boilers.

The rate of transfer of heat through air is slower than through any substance which is available for boiler covering; therefore a covering of perfectly quiet air would be one of the best possible; but the rate of transfer from a substance to air is even slower than the rate through air; therefore the greater number of such obstructions interposed the better the heat insulation, but there must be no air currents. For these reasons, "air cell" coverings have received much attention and are receiving more attention now. It is also quite important, if possible, that the covering does not touch the boiler, provided currents of air between the boiler and covering can be effectually prevented.

August Accidents.

Our record of train accidents in August, given in this number, includes 83 collisions, 94 derailments and five other accidents, a total of 182 accidents, in which 43 persons were killed and 251 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS.	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two.....	11	0	0	11
Misplaced switch.....	2	2	1	5
Failure to give or observe signal.....	9	2	3	14
Mistake in giving or understanding orders.....	0	5	0	5
Miscellaneous.....	10	3	5	18
Unexplained.....	10	9	11	30
Total.....	42	21	20	83

DERAILMENTS.	Total.
Broken rail.....	1
Loose or spread rail.....	1
Defective bridge.....	1
Defective switch.....	1
Soft track.....	1
Broken wheel.....	3
Broken axle.....	8
Broken truck.....	3
Fallen brakebeam.....	2
Failure of drawbar.....	2
Broken car.....	2
Burst brake-hose.....	1
Misplaced switch.....	1
Runaway train.....	2
Bad switching.....	2
Derailing switch.....	2
Animals on track.....	3
Washout.....	3
Malicious obstruction.....	1
Accidental obstruction.....	4
Unexplained.....	50
Total.....	94

OTHER ACCIDENTS.	Total.
Broken side rod.....	1
Various breakages of rolling stock.....	3
Other causes.....	1
Total.....	5

Total number of accidents..... 182

A general classification shows:

	Collisions.	Derailments.	Other accidents.	Total.	P. c.
Defects of road.....	0	5	0	5	3
Defects of equipment.....	11	21	4	36	20
Negligence in operating.....	42	7	1	50	26
Unforeseen obstructions.....	0	11	0	11	5
Unexplained.....	30	50	0	80	46
Total.....	83	94	5	182	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other accidents.	Total.
Passenger.....	35	20	3	58
Freight and other.....	121	75	2	198
Total.....	156	95	5	256

The casualties may be divided as follows:

	Collisions.	Derailments.	Other accidents.	Total.
Killed:				
Employees.....	15	10	1	26
Passengers.....	5	7	1	13
Others.....	3	1	0	4
Total.....	23	18	2	43
Injured:				
Employees.....	63	23	2	88
Passengers.....	63	73	16	152
Others.....	3	3	0	6
Total.....	134	99	18	251

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	2	14	3	4
Defects of equipment.....	1	15	1	3
Negligence in operating.....	5	71	16	71
Unforeseen obstructions and maliciousness.....	0	50	1	2
Unexplained.....	5	32	5	13
Total.....	13	152	26	93

Twenty-nine accidents caused the death of one or more persons each, and 33 caused injury but not death, leaving 120 (66 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with August of the previous five years shows:

	1898.	1897.	1896.	1895.	1894.	1893.
Collisions.....	83	64	48	53	25	29
Derailments.....	94	61	54	71	80	99
Other accidents.....	5	3	2	8	9	7
Total accidents.....	182	128	104	132	150	147
Employees killed.....	26	17	39	39	25	28
Others killed.....	17	15	18	19	25	28
Employees injured.....	93	55	53	41	94	67
Others injured.....	158	85	87	99	42	95
Passenger trains involved.....	58	36	35	48	44	55

Average per day:

	1898.	1897.	1896.	1895.	1894.	1893.
Accidents.....	5.87	4.13	3.36	4.26	4.84	4.74
Killed.....	1.39	1.03	1.52	1.58	1.61	2.13
Injured.....	8.10	4.52	4.52	4.52	4.39	2.94

Average per accident:

	1898.	1897.	1896.	1895.	1894.	1893.
Killed.....	0.24	0.25	0.45	0.37	0.33	0.44
Injured.....	1.38	1.10	1.34	1.06	0.90	1.04

Passengers were killed in six accidents in August.

a larger number of accidents fatal to passengers than we have had to report since January, 1894; and the number of passengers killed or fatally injured, 13, is larger than has been reported since that time, except when there was a great disaster.

In the month referred to there was a rear collision at Hackensack, N. J., killing 13. For the next 29 months the records were comparatively light, and then came Atlantic City and Logan, both in the same month, July, 1896, killing 75. Since then Gurnee, Ala. (December, '96), Newcastle, Col. (September, '97), and Garrison, N. Y. (October, '97), have been the only cases notable for the number of passengers killed. The six accidents referred to in the present report are the following: 2d, St. Joseph, Ariz.; 3d, McAdory, Ala.; 10th, Cherubusco, Ind.; 21st, Speed's, Ind.; 21st, Sharon, Mass.; 28th, New Castle, Ala. The Sharon collision has been inquired into by the Massachusetts State Railroad Commissioners, but no report has yet been issued. Some reflections on one of the lessons of this collision were published last week.

The train wrecked at New Castle, Ala., carried the Sixty-ninth Regiment of New York Volunteers, and the victims were soldiers. It was claimed, with a good show of plausibility, that the train was running excessively fast on a curve, and that this reckless running was the cause of the derailment; and the soldiers threatened the life of the engineer; but it is also said on good evidence that the speed was not over 35 miles an hour. Another case in which a military train was wrecked was that at Fort McPherson, Ga., on the 21st. Other serious accidents in the list are Canton Junction, Mass. (8th); Port Huron, Mich. (23d), and Rector street, New York City (11th).

A variety of unclassified railroad accidents occurred in August. At Prescott, Ariz., on the 17th, a locomotive of the Santa Fe, Prescott & Phoenix, exploded in the round house, killing two men. At Truckee, Cal., a dozen freight cars and some buildings were burned up, and passenger trains were delayed several hours, by a fire due to the explosion of naphtha in a freight car, the fire being caused by a cigarette which was lighted by a tramp. On the 11th, at Gila Bend, Ariz., a passenger train of the Southern Pacific had to be stopped on account of a sand storm, which terrified the passengers; empty freight cars were overturned by the wind and a tank house was blown down. Near McClure, Ill., on the 11th, three Italian laborers unloading rails were killed by the overturning of a car. It is said that the accident was caused by completely unloading one side of the car, while leaving the other side untouched.

Near Bondville, Mass., on the 27th, six persons in a carriage were killed by being struck by a train at a grade crossing; near Petersburg, Va., on the 24th, and near Frankfort, Ind., on the 12th, there were similar accidents, in each of which three persons were killed.

A press dispatch from Vancouver, B. C., Aug. 14, states that a passenger train of the Canadian Pacific, running rapidly, was struck by lightning, the bolt entering the car at a window and going out through the floor. From Victoria, B. C., it was reported, Aug. 17, that a work train on the Union Colliery railroad broke through a trestle bridge and fell into Trent River; six persons were killed.

The number of electric car accidents reported in the newspapers during August was 13, in which three persons were killed and 53 injured. One of these, the failure of a bridge near Utica on Aug. 7, has already been reported in the Railroad Gazette. The one other accident fatal to passengers was at Pittsburgh on the 24th, where a car was struck by lightning and two passengers were killed. In this case four passengers were injured by jumping off the car. There was one case of a freight train running into a street car, three butting collisions due to misunderstanding of orders, and one car was partially wrecked by a malicious explosion of dynamite.

Annual Reports.

Missouri, Kansas & Texas.—The year ending June 30 was the most prosperous enjoyed by this company since its reorganization. Increased tonnage and freight revenue and reduced cost of operation combined to give the company considerably the highest gross and net receipts it has yet earned. The surplus was equal to 3.65 per cent. on the \$13,000,000 of preferred stock, and was double the best previous figure reported, which was in 1895, when the company was not paying full interest on its second mortgage bonds.

The income account for 1898 and 1897 is given below:

	1898.	1897.	Inc. or Dec.
Passenger earnings.....	\$1,919,556	\$1,818,138	I. \$101,368
Freight earnings.....	9,559,000	9,107,207	I. 451,793
Total gross.....	12,047,237	11,478,315	I. 568,922
Expenses and taxes.....	8,182,388	8,337,401	D. 155,013
Net earnings.....	\$3,864,849	\$3,140,914	I. \$723,935
Int. and rentals.....	3,427,170	3,427,267	D. 97
Balance.....	\$437,679 (def.)	\$286,353	I. 724,032
Other income.....	69,090	137,000	I. 67,910
Less adjustments.....	32,013	.....	I. 32,013
Surplus.....	\$474,756 (def.)	\$149,353	I. 624,109

The ratio of expenses was reduced from 73 per cent. to 68. This was accomplished by reductions in both maintenance items and in the cost of conducting

transportation. The latter is a rather noteworthy circumstance, because both passenger and freight traffic largely increased over the totals for the previous year. The classification of expenses in 1898 and the changes from last year are brought out below:

	1898.	Inc. or Dec.
Conducting transportation.....	\$5,019,371	D. \$104,012
Maintenance of way.....	1,324,052	D. 252,529
Maintenance of equipment.....	900,506	I. 120,292
General expenses.....	668,300	I. 63,566
Total.....	\$7,909,228	D. \$172,293

The company carried in 1898 3,569,000 tons of freight, or 331,919 more than in 1897, an increase of 10.2 per cent.; the average distance carried decreased from 314 to 292 miles, so that the increase in ton-miles was only 2.2 per cent. This larger traffic, however, was moved with a decrease of nearly 7 per cent. in freight train miles run. The passenger statistics make an even better showing. The number of passengers carried increased 8 per cent., and the passenger miles 89,525 thousands, or 14 per cent., but fewer passenger train miles were run by 544,000, or 17 per cent. Loaded freight car mileage was 67.7 per cent. of the total in 1898, against 63 per cent. last year. The average mileage of loaded cars per train increased 63, while that of empties decreased 92 miles.

The company is able to report an improvement in its ton-mile rate. This was 8.95 mills in 1897, and is now 9.18 mills. It is still lower than the average of Western roads.

The improvement work of the year has included the building of 19 miles of side tracks and ballasting of 38 miles of road. This work is now in progress on 57 additional miles; 117 miles were relaid with heavier rails, the shops at Sedalia were completed and half a dozen stations rebuilt. The funds for betterments are provided by the sale of securities, and \$695,000 still remains available in this account. The net earnings have permitted the payment of \$86,899 to close the car trusts and to reduce the outstanding equipment notes to \$151,517.

Long Island.—The annual report for the year ending June 30 shows a considerable increase in gross earnings, the largest part of which was absorbed by the extensive improvements which have been in progress since the present management assumed control of the property. The increase in gross earnings was \$378,328, of which \$180,117 was due to freight traffic and \$167,564 to passenger. The gain in the former was equal to 15½ per cent. and in the latter to 7.6 per cent. The increase in total gross earnings was equal to 9.56 per cent., in expenses to 9½ per cent., and in net earnings to 9.6 per cent. The principal items of the revenue account for 1898 and 1897 follow:

	1898.	1897.	Inc.
Passenger earnings.....	\$2,361,219	\$2,193,654	\$167,565
Freight earnings.....	1,348,081	1,167,963	180,117
Total gross.....	4,333,194	3,954,866	378,328
Oper. exp. and taxes.....	3,195,233	2,947,994	247,244
Net earnings.....	\$1,137,956	\$1,006,872	\$131,084
Other income.....	129,869	114,485	15,021
Total income.....	\$1,267,825	\$1,121,717	\$146,108
Fixed charges.....	1,023,950	1,019,512	4,438
Surplus.....	\$243,875	\$102,205	\$141,670

Passenger receipts were 54.5 per cent. of the total in 1898 and 55.5 in 1897.

The surplus will be used for betterments. There were increases in each class of expenses in 1898 except general expenses. The total charges to capital account for additions and betterments were \$233,845, of which the largest items were \$92,727 for 20 new passenger cars, \$70,318 on account of 15 new locomotives, and \$48,400 for completing an incline connection with the Brooklyn Elevated. In connection with this road, the company ran during the summer through trains from Brooklyn terminals to Rockaway and Jamaica, as well as to Coney Island. The importance of this elevated connection to the Long Island road is that it is one step in the complex problem of a better connection between the Long Island towns and lower Manhattan Island.

The competition of the electric surface railroads has become a serious matter on some divisions, especially those reaching the great seaside summer resorts near New York. In other parts of its territory, these lines are being used to reach towns off its road, and the policy of building short electric feeders to the steam road will be continued wherever advisable.

President Baldwin says: "The policy of the directors has been to improve the physical condition of the property, and to provide train service even beyond the present needs of the public, in order to invite an increased traffic in the future. With twelve separate branches in operation, each demanding through express service to the terminal, the problem is difficult, but it has been met in a generous spirit, and to the general satisfaction of the public. The increased passenger train mileage has cost fully \$150,000, and the indications are that it will be wise to continue to give the largely increased service."

Cleveland, Cincinnati, Chicago & St. Louis.—This company very largely increased its traffic and its gross revenues in the year ending June 30, but nearly all the gain in receipts was used up in

increased expenses, mostly for maintenance and repairs, which two accounts absorbed \$754,000, or over two-thirds of the total increase. Although the tonnage moved was much greater, the cost of "conducting transportation" was less than \$300,000 above the 1897 total. The comparisons of the revenue statements of the last two years follow:

	1898.	1897.	Inc.
Gross earnings.....	\$14,320,094	\$13,117,111	\$1,202,983
Oper. exp. and taxes.....	10,968,368	9,864,664	1,103,704
Net earnings.....	\$3,351,726	\$3,252,447	\$99,279
Interest and rentals.....	2,905,024	2,883,926	21,098
Balance.....	\$446,702	\$368,521	\$78,181
Other receipts.....	35,189	.....	35,189
Total income.....	\$481,891	\$368,521	\$113,370
Dividends.....	\$75,000	\$75,000	.....
Surplus.....	\$106,891 (Def.)	\$6,479	\$113,370
Charges written off.....	.....	40,214	.....

The gross earnings reported above were higher than in any of the last ten years, except in 1893, in which the World's Fair traffic brought the total up to \$14,669,100.

The increase in tonnage carried was equal to 17.1 per cent., and the ton-miles gained 27 per cent. Train loads were larger, and the freight-train miles increased only 11 per cent. This left freight-train mile earnings unchanged, although the ton-mile rate fell off over half a mill. The more important statistics follow:

	1898.	1897.	Inc.
Tons carried.....	9,630,159	8,223,347	1,406,812
Tons, one mile.....	1,696,221,146	1,343,484,916	352,736,230
Freight train miles.....	6,062,784	5,442,063	650,712
Ton mile rate, cents.....	.545	.614	.....
Passengers carried.....	5,093,978	4,937,250	156,728
Passenger miles.....	200,398,657	186,657,170	14,341,487
Pass. train miles.....	4,808,764	4,922,582	.....
Pass. mile rate.....	c 1.915	c 1.964	.....
Pass. tr. mile earn.....	c 80.06	c 74.45	c 5.61

The largest change in the expense account was the increase of \$551,475 in maintenance of equipment. This is explained by larger car and locomotive repairs, and by the cost of new equipment. The charges in 1898 for new rolling stock included \$326,000 for new freight cars, \$145,420 for 15 engines, and \$43,000 for seven new passenger cars. The total cost of this equipment was not, however, included in last year's expenses; the greater part is carried in the balance sheet in "New Equipment account," which is charged with \$417,894. This is payable monthly over a period of three years. Other improvement expenses included \$56,577 for air brakes and couplers, \$96,622 for 29 miles of new side tracks and new yards at Greensburg, Ind., and \$36,590 for new stores on the viaduct at Columbus, O., required by the contract with the city.

The company paid three quarterly dividends of 1¼ per cent. on the preferred stock, having resumed their payment after suspending two payments in 1897.

The route between Liverpool and Manchester, the classic ground of experiments in methods of carriage, to which the world already owes the lessons taught by the Bridgewater Canal, the Liverpool & Manchester Railway and the Manchester Ship Canal, seems likely to give us ere long a fourth object lesson; for the trade of Liverpool is not quite so prosperous or so profitable as it used to be, and the Liverpool men of business think that the main reason is the cost of freight service. Having failed to get what they regard as adequate concessions from the existing railroad companies, they have half determined to provide a new means of transport for themselves. Out of a large number of schemes put before it, the Chamber of Commerce appears to have seriously considered three. It rejected a scheme according to which road wagons or drays, known in Liverpool as "lurries," would be joined together into trains and hauled to Manchester by locomotives on tramways—or rather plate ways, for the flange would be on the rail—laid along the roads. It rejected a second and more feasible scheme, according to which the lurries would be mounted outside Liverpool astride of the trucks of a narrow gauge railroad, dismounted at Manchester, and then hauled by horses to their final destination in a particular warehouse. But it appears to have generally approved a scheme for a new railroad of normal gauge, for freight only, which should be built, with capital guaranteed by the Mersey Dock Board and the Liverpool Corporation, on its own land, across country, but which should be allowed to work its trucks through the streets, reconstructed for the purpose, in the great towns at either end. How such a scheme is to be carried out for £1,600,000, why Manchester should lend the use of its streets to a new competitor with its own ship canal, and why, if Liverpool corporation trains or trucks can be worked through the streets the trains or trucks of the existing railroads should not use them also, so avoiding the heavy terminal expenses for loading and unloading at either end—all these are questions to which the Liverpool Chamber of Commerce may possibly know an answer. But that answer is not obvious to the ordinary observer.

A German writer says that on the railroads in his country he finds most things "forbidden," unless they are "strictly forbidden" or "most strictly forbidden." On the walls and windows of a single dining car he found no less than 39 such prohibitions. Twice smoking was forbidden; four times it was forbidden

to remain in the car longer than a suitable time for consuming a meal; six times "leaning the body out of the window" was "most strictly forbidden on account of the danger to life consequent thereon," while six times more the window-frames exhibited the concise warning "Do not lean out" in German, and another six times in Italian. Besides there was a large placard beginning with "It is forbidden," and followed by 15 deadly sins against railroad operation, which may be summed up in these commandments: "Thou shalt not get in or out of the car before the train stops. Thou shalt not throw things out of the window. Thou shalt not be drunk. Thou shalt not bring dogs into the car. Thou shalt have no loathsome disease. Thou shalt not sass the conductor. Thou shalt not make fun of the railroad management," and others of the same sort. Replying to the criticism of an Italian that the rule "not to lean the body out of the window on account of the danger to life consequent thereon" might have been better expressed by "Don't lean out," this writer says that in his heart he agreed with the Italian, but in view of the prohibition of want of respect to the railroad management he endeavored to set in the best light the management's care for the bodily welfare of the traveler. "What does 'lean out' mean? We must know what we may not lean out, and where we may not lean it out," but even then he fears it was an error not to have added to "body" "or any part of the body." And then it was important to say why we must not lean out, otherwise the citizen's affection for the state authority might have been disturbed by an apparently unnecessary prohibition.

NEW PUBLICATIONS.

Inspection of the Materials and Workmanship Employed in Construction. By Austin T. Byrne, C. E. New York: John Wiley & Sons. London: Chapman & Hall. 1898. 12mo. 539 pp.

"The aim of this publication is to present in as concise a form as possible (1) the duties of the inspector; (2) the characteristics and defects of the materials used in construction; (3) a description of the methods employed in preparing the materials for use; (4) the manner of placing the prepared materials in the structure; and (5) to indicate the points to which the inspector must direct his especial attention to secure a faithful compliance with the plans and specifications."

In fulfillment of the above purpose the author has put in a compact form much valuable instruction and information, judiciously selected and concisely expressed, upon materials and workmanship of masonry, timber, metal and earthwork construction, roofing, plumbing, plastering, glazing, painting, paving, water pipe, sewers, etc.; information not readily accessible to the ordinary practitioner.

While all has not been said that could be said on the above subjects, we know of no other pocketbook which presents so much practical instruction upon these lines. The author could advantageously omit the pages devoted to mensuration and tables common to all pocketbooks and extend his true subject, inspection, in other directions, without making the book cumbersome.

Statistics of the American and Foreign Iron Trades for 1897. By James M. Swank, General Manager American Iron & Steel Association. Philadelphia: No. 261 South Fourth street. Price \$3.

The annual statistical report of the American Iron & Steel Association was presented to the members Sept. 10, and is now ready for distribution. Those of our readers who are interested in following the statistics of the iron trades are familiar with the contents of these annual reports. This covers statistics of the iron and steel industries of the United States for 1897 and earlier years, statistics of the coal, railroad and other related industries, and statistics of imports and exports in 1897. The compilation is very complete and careful, and we suppose that it is the most authoritative document of the kind that can be found; in fact, we know of no other publication at once so complete and so convenient.

TRADE CATALOGUES.

"The General Electric Company at Boston" is the title of a unique pamphlet arranged especially for the use of the members of the American Street Railway Association, which met at Boston the first week in September. We find here described all the important power stations in and about Boston, giving full and accurate particulars regarding the station apparatus made by the General Electric Company, and in use at the several power plants. The subway, the Nantasket Beach line and other important electric railroad work near Boston each receive a careful write-up. The compiler of this pamphlet does not, however, limit the scope of the book to technical descriptions, there being short accounts of many points of historical interest. It is a pleasure to look over these pages, made attractive by many carefully executed engravings, and to find so much of real interest to both the engineer and the visitor.

The Dedenda Gong.—The J. G. Brill Co., Philadelphia, describes in a 9 in. x 6 in. pamphlet a new mechanism for working gongs on street cars. It is

made up of four pieces: the treadle, a malleable iron guide which screws to the floor, a malleable frame for holding the hammer and the weighted hammer. A complete disconnection between the hammer and treadle is made during the last half inch of the travel of the hammer. The weight on the hammer is four or five times the weight of the hammer head, thus bringing the hammer away from the gong instantly.

The Lap Joint Railway Track Co., of New York, issues a special 11-page pamphlet for the street railroad convention in which is described in some detail the lap joint made by the company, and ten claims for its superiority are mentioned. The closing pages are taken up with some opinions from engineers of lap joints.

TECHNICAL.

Manufacturing and Business.

Nat C. Dean, who has heretofore represented jointly the Fox Pressed Steel Equipment Co. and the Carbon Steel Co., has resigned as agent of the former, and in future will devote his entire time to the interests of the latter company as Western Sales Agent, with offices in the Fisher Building, Chicago, and Havemeyer Building, New York.

Frank B. Stone, 279 Dearborn street, Chicago, has just closed a contract for 450,000 cross-ties for delivery to a southwestern railroad.

The Pittsburgh & Lake Erie has ordered from the Union Switch & Signal Co. automatic signals for protecting the stations at Coraopolis, Shannopin, Rock Point and Lowellville.

Willis Shaw, New York Life Building, Chicago, has recently sold a number of the Flory Hoisting Engines to the Minneapolis, St. Paul & Sault Ste. Marie, the Lydon & Drews Co., Chicago, the Deering Harvester Co., Groton Bridge Co., Missouri Valley Bridge & Iron Co., John S. Metcalf & Co. and to a number of mines in the West.

The Chicago Pneumatic Tool Co., Chicago, reports further large orders from Japan for pneumatic drills, hammers and riveters.

McCord journal boxes and journal box lids will be used on 300 Chicago, Burlington & Quincy cars ordered from the Wells & French Co., and on 300 ordered from the Michigan Peninsular Car Co.

George S. Marshall has been appointed Sales Agent of the Standard Pneumatic Tool Co., Chicago. He is a son of E. S. Marshall, General Agent of the Missouri Car and Foundry Co., St. Louis, Mo.

The contract with the Edison Electric Illuminating Company of Lebanon, Pa., will terminate June 1, 1899, and the city is about to take steps to obtain proposals for 125 arc lamps, for a period of from five to ten years. William D. Zehnder, Lebanon, Pa., should be addressed. George W. Hayes is City Engineer.

W. D. Sargent, General Manager of the Sargent Co., has returned from an extended trip through England and Europe, and reports that the prospects are favorable for the introduction of a large variety of American products in the countries which he visited.

A recent letter from the builders of the Detroit, Lake Shore & Mt. Clemens Electric Railroad to the American Rail-Joint & Manufacturing Co., of Cleveland, gives some data as to the saving in time and labor in laying rails by the use of American rail joints. This road is about 20 miles long, and is laid with 70-lb. standard T rails. Track was laid at the rate of one mile in six hours, and three men were used to put on the bonds and rail joints; this is at the rate of 586 joints, with bonds, for three men working ten hours. On another road the builders state that track was laid at the rate of one mile in ten hours, and that eight men were required to put on the old style four-hole angle plate joints to keep ahead of the track gang, or 352 joints, without bonds, for eight men working 10 hours. The builders further state that the Detroit, Lake Shore & Mt. Clemens was laid on soft clay and, previous to ballasting, the work train, consisting of a 20-ton locomotive and from eight to ten flat cars, was run over this track for two months without breaking or loosening any of the joints.

The Ritter-Conley Company of Pittsburgh has received three orders for work in Cuba. All are for stacks for sugar refineries at Holguin and Nuevitas, which were destroyed by the insurgents early in the war. One stack is to be 9 ft. in diameter and 150 ft. high. The two for the Holguin district are to be 8 ft. in diameter and 84 ft. high.

The Metropolitan West Side Elevated of Chicago will buy from the Edward P. Allis Company of Milwaukee two engines of 2,000 h. p., to be installed in the extension to the company's power house.

The London correspondent of the Birmingham Daily Post states that information reaches him from an official source that the Victorian and South Australian governments will invite tenders for railway material in the course of October, and that the material, including rails and girder work, is intended for relaying the Government lines and the development of the agricultural districts.

Iron and Steel.

The Wabash Bridge & Iron Works, of Wabash, Ind., with a capital stock of \$60,000, has been licensed to do business in Illinois with a capital stock of \$2,500,000.

At a meeting of the stockholders of the Altoona Iron Co. the following officers were elected: President, John Fullerton, Philadelphia; Secretary and Treasurer, H. F. McCauley. The directors are John P. Levan, G. W. Strattan, W. M. Findley, D. K. Ramey, Robert Smiley, of Altoona, and John Reilly.

It is stated that a new company has been incorporated at Springfield, Ill., with a capital of \$200,000, for the purpose of building a large wire mill at Joliet. The incorporators named are: C. W. Lucas, Frederick A. Rowland and Wm. H. Martz, and it is stated that Cary E. Robinson of Joliet, formerly local manager of the Consolidated Steel & Wire Co., is the principal stockholder.

It is reported that rail manufacturers will hold a meeting in New York this week for the purpose of raising the price of rails.

Newspapers state that contracts will be awarded in Chicago in a few days for the building of an inland lake harbor at East Chicago as a preliminary to the building of a steel mill. It is stated that the company is headed by Carnegie and Rockefeller interests and contemplates investing \$25,000,000 in the harbor and mill.

New Stations and Shops.

The Lehigh Valley has given a contract to A. F. Chapman & Co., of Buffalo, for building a blacksmith shop 200 x 75 ft., a cabinet shop 200 x 60 ft., and a paint shop 224 x 170 ft., at Sayre, Pa. The buildings will be of brick, single story, with iron roof trusses and slate roofs. The railroad has also awarded to the same company a contract for building a passenger station and office building at Auburn, N. Y. A contract has also been placed with Driscoll Bros. & Co., of Ithaca, N. Y., for building new freight and passenger stations at that point.

We are officially informed that there is no truth in the report that the New York, New Haven & Hartford will build repair shops at Norwalk; and that the matter has never been considered.

Last week we stated that the Baltimore & Ohio would build a new produce warehouse at Pittsburgh. Contracts for this work have been let as follows: For all piling, lumber, etc., to H. C. Huston, Connellsville, Pa.; for Wilson rolling doors, to James G. Wilson, New York; for the structural iron work, to the Schultz Bridge & Iron Co., Pittsburgh, Pa.; for skylights, corrugated iron sides, slate, etc., to Valle & Young, Baltimore. The approximate cost is \$13,800. Work has been commenced and will be pushed to completion as fast as possible.

George Grant, of St. Paul, received the contract for the new roundhouse to be built at St. Paul for the Chicago, Burlington & Northern. The contract for the new roundhouse to be built at Savannah for the same company went to Hennessy & Cox, of St. Paul.

It is stated that plans have been submitted to the State Railroad Commission of Alabama for a new Union station to be built at Sheffield.

According to press dispatches, plans have been decided upon for a new Union station to be built in Dayton, O., by the Dayton & Union.

Armstrong & Printzenhoff have taken out a permit to build, in Philadelphia, for the Philadelphia & Reading, two new sheds on the pier between Chestnut and Walnut streets. The main shed is to be 89 ft. x 305 ft., and the wing 31 ft. x 73 ft.

Holmes, Booth & Haydens, Waterbury, Conn., are making extensive repairs and additions to their plant. The Berlin Iron Bridge Co., East Berlin, Conn., has secured the contract for the steel roof work for the boiler room, 40 ft. x 80 ft., the new muffle room, 35 ft. x 80 ft., and the new brass mill, 118 ft. x 90 ft.

We are officially informed that it has not yet been decided what kind of a building will be put up at Champaign, Ill., by the Illinois Central.

Work has been commenced on the annex to the elevators of the Peavy Grain Co. at 102d street and the Calumet River, South Chicago, mentioned in our issue of last week. Piles are being driven for additional docks, and the work will proceed as rapidly as possible.

Interlocking.

The Pittsburgh & Lake Erie is to put in interlocking plants at the terminal station at Pittsburgh and at Belle Vernon Junction. The Pittsburgh plant will require 40 levers.

Chicago Public Works.

The two parts of the lake section of the new northwest land tunnel were connected on Sept. 17, the difference in the levels of the two parts being 3 in. One part of the lake section was started at Oak street and worked outward toward the crib, the other being started at the crib four miles out in the lake and worked in to the connection just made. This is a part of the new tunnel system by which water is to be supplied to two new pumping stations in the northwest and southwest sections of the city. As planned it will be 13.5 miles long, 9.5 miles being land tunnel and the four miles just completed ex-

tending from the foot of Oak street in a northeasterly direction under the lake to a point four miles from shore.

Work on the lake section was commenced in October, 1896, the contract having been awarded to the FitzSimons & Connell Co., of Chicago. It is built of brick and is 10 ft. in diameter. As previously mentioned in these columns, considerable difficulties have been met in pushing the bore under the lake, from quicksand and from bowlders which had to be blasted, and a part of the work had to be done under air pressure. The lake section has cost about \$600,000, and with its completion only about three miles of the tunnel remain to be finished. Six miles of the land tunnel are completed, but work on that section has been stopped for some months, owing to litigation between the city and Joseph J. Duffy, the contractor. This case is now in the Supreme Court, and it is expected that it will be settled in October, when the work will at once be resumed. It is hoped that the entire tunnel and the pumping stations will be ready for use within one year.

M. C. B. Association Standards.

The Standards and Recommended Practice of the Association as revised by the last letter ballot, and as they will appear in the proceedings of 1898, soon to be issued, can be had in pamphlet form at the office of the Secretary, Mr. Jno. W. Cloud, Rookery Building, Chicago, Ill., at 25 cents per copy after Oct. 1. The large sheets of drawings, 30 by 38 in., on semi-transparent paper for blue printing, will be modified as follows to conform with small revised sheets:

Sheets M. C. B. 1, 2, 4 and 5 have had notes added without change of drawings.

Sheet M. C. B. 7 has drawing for axle of 80,000-lb. capacity car added to it.

Sheets M. C. B. 8, 9, 13, 14 and 15 made new.

Sheets M. C. B.—C, D, G, H, I and J made new.

Sheets M. C. B. 3, 6, 10, 11, 12, A, B, E and F unaltered.

Any of these sheets may be had at 25 cents per copy after Oct. 15.

The revised Air Brake and Signal Instructions shown in Appendix A of the Recommended Practice have been published separately, and uniform with the Rules of Interchange. The revised Rules for Loading Long Materials shown in Appendix B of the Recommended Practice will be published in pamphlet form and will be ready for distribution after Oct. 1. The Air Brake and Signal Instructions and the Rules for Loading Long Materials are sold separately, each at the same price as the Rules of Interchange, viz.: 25 copies, \$1; 50 copies, \$1.75; 100 copies, \$3; single copies, 5 cents.

Axle Light for the Santa Fe Limited.

The National Electric Car Lighting Co., which is introducing an axle electric light, has made a contract with the Pullman Co. for lighting all the Pullman cars which run on the Santa Fe Limited between Chicago and Los Angeles, without change, a distance of 2,265 miles. There are four trains in this service, each of which has an observation-compartment car, three sleeping cars, a handsome dining and library car—the two last named being already equipped with axle light and fans. Passes are not honored on this train. The electric equipment of each train will aggregate 4,928 candle power, as follows:

1 observation-compartment car.....	1,056 C. P.
3 sleeping cars at 1,056 C. P. each.....	3,168 "
1 dining car.....	352 "
1 library car.....	352 "

Total.....4,928 C. P.

All berths will be provided with berth lights, and this will be the first train in the world carrying such a large supply of light service exclusively from the car axles. In fact, it is the intention to light the locomotive headlight from the same source, thus making those four trains solid axle-light trains throughout.

The dining and library cars, together with about 60 other cars of the Santa Fe, have been in service with this light for nearly two years, and the results have been so satisfactory to the railroad company that an extensive application of this light has recently been decided upon. The introduction of this system on the limited trains is a departure from previous practice, which necessitated a light plant in the baggage car. The objection to this plan is that if the baggage car meets with an accident or the plant is out of order the entire light output of the train is deranged. In the axle-light system such a thing cannot happen. Each car has its own plant of dynamo and storage batteries, and actual measurements made on the cars already equipped demonstrate that after the round trip to Los Angeles of over 4,500 miles and supplying the cars during six nights with brilliant lights, the storage is as full as it was at the start. In case of an accident to the apparatus of one car the crippled car can be lighted from an adjoining car until a terminal is reached where repairs can be made.

Lucol Paint.

The tests of paints at the 155th street viaduct, New York, have attracted much attention. We have just received a circular from the American Lucol Company, 44 Broadway, New York, one of the seventeen paint makers whose paints were among those tested, wherein they analyze a report on the condition of the paints made by Mr. Seaman. They show that their paint has thus far stood this severe test better than any of the other sixteen, notwithstanding that their paint has the most severe exposure. We are not able

to judge of the merits of the case, and are inclined to the opinion that a longer time should elapse before definite conclusions of value can be drawn. The fact that the paints of the American Lucol Company are making such a remarkable showing on 155th street viaduct is creating some surprise among those who have not had practical experience with Lucol. Engineers, as well as paint makers, will wait with interest for a more complete report on this test.

Texas & Pacific Transfer Boat.

On Sept. 19 the new steel boat built for the Texas & Pacific Railway was launched at the shipyards of the Iowa Iron Works, at Dubuque, Ia. The boat is 303 ft. long and 56 ft. beam, and is said to be the largest hull ever floated on the Mississippi River, although when launched the draft was light enough to enable the boat to be taken through the rapids. She will be used at New Orleans for transferring cars.

THE SCRAP HEAP.

Notes.

The ticket brokers recently arrested at Cincinnati have been let off, the court to which they appealed having decided that the city ordinance under which they were convicted is invalid. Stephen Murray, a ticket broker of Atlantic City, has been imprisoned for violating the state law concerning ticket brokerage.

The Boston Herald reports that some of the retail merchants on Tremont street in that city have suffered a decided loss of business since the street cars, which formerly ran in front of their doors, have been transferred to the subway.

A press dispatch from New Haven, Conn., says that the New York, New Haven & Hartford has decided not to put revenue stamps on excess baggage tickets, and will contest the question in the courts if the Revenue Department insists on the payment of the tax.

A press dispatch from Chicago says that the Treasury Department intends to send 10 million ounces of silver from Philadelphia to San Francisco by freight. The quantity named is equal to about 500 tons, or, say, 25 carloads. A military guard would be sent with the train.

Several attempts at train wrecking have lately been reported in South Carolina. At Spokane, Wash., it is reported that persistent attempts have been made to destroy bridges on the Northern Pacific and the Oregon Railway & Navigation railroads by the use of dynamite.

An Omaha paper says that the use of the Sebastian round-trip ticket saved the railroads \$4,352 on Colorado Day business at the Omaha Exposition. Two hundred and fifty-six return coupons deposited with the joint agent at Omaha were left uncalled for. If ordinary tickets had been used they would have fallen into scalpers' hands.

The Canadian Pacific Railway has finished putting up a copper telegraph wire from Montreal to Vancouver, 2,906 miles. The circuit is worked through with two repeaters, one at Fort William, 998 miles from Montreal, and the other at Swift Current, 937 miles from Fort William. The iron telegraph wires on this line, which are now No. 6 gage, are cut at Winnipeg, and there are repeaters about once every 500 miles.

The grain elevator operated by Paddock, Hodge & Co. and owned by the Union Elevator and Transportation Company, Toledo, O., was wholly destroyed by fire Tuesday evening, Sept. 20. There were between 500,000 and 600,000 bushels of grain in store in the elevator, and the total loss is estimated at about \$600,000; the insurance amounted to \$394,000. Ten persons who were in the building were killed and fourteen injured. The Toledo & Ohio Central, whose tracks are adjacent to the elevator, lost a building and a number of cars, the damage to the road being estimated at about \$50,000.

Yellow Fever Quarantines.

On Sept. 21 the principal towns in Texas on the railroads leading from New Orleans established quarantines against that city on account of the reported presence of four cases of yellow fever, and since that time there has been a serious falling off in traffic. The Southern Pacific announces that through freight will not be delayed, arrangements having been made to carry it around the city of New Orleans. Freight will be loaded at Algiers as usual. A through excursion train from the East which passed through New Orleans was admitted into Texas without objection. The Louisville & Nashville took off one of its through passenger trains south of Mobile. Some trains to and from Memphis have been taken off. The quarantine officers at Memphis prohibit the landing of New Orleans boats at that city, even on their downward trips. The general impression gained from reading the Southern newspapers is that the quarantine regulations in both Mississippi and Alabama are disturbing passenger traffic seriously; but at the same time it is given out at Cincinnati and Louisville that through freight and passenger business to the South is not much affected, and that the obstacles to traffic are trifling, as compared with the difficulties experienced last year.

The Whittenton Collision.

The crossing collision of passenger trains on the New York, New Haven & Hartford at Whittenton Junction, Mass., on the evening of Sept. 6, about 8 o'clock, was the subject of a hearing before the Massachusetts State Railroad Commissioners last week. A passenger train from Mansfield was run into by a passenger train from Boston at the junction named,

near Taunton, where the two lines converge; and the Boston train rolled over the smoking car of the other train. One passenger was killed and 14 other persons were injured. The signals were clear for the train from Boston. On both the home and the distant signals of the Mansfield line the lamps had gone out, and the engineman was therefore approaching at moderate speed; when he came near to the tower, so near that he had already seen that the blade of the home signal was horizontal, he thought he saw a hand-motion lamp signal from the window of the tower, indicating go-ahead, and he therefore ran upon the crossing just in time to get in the way of the Boston train. He had brought his train to a stop before the collision occurred. The signalman says that he gave no hand-motion signal, and the General Superintendent of the road states that the light seen by the engineman was the lantern on a highway crossing gate, beyond the tower, which gate was being lowered.

The engineman, C. H. Bourne, has been a runner for five years. In his testimony he said that as he approached the tower he shouted to the signalman, asking if it was all right to go ahead, but he received no reply. It seems that Bourne now admits that it is likely that he saw the light on the crossing gate, though his fireman insists that "somebody shook a lantern." The signalman, Maher, had been on duty at this tower only two days, being a substitute for the regular man. After the collision the station agent went into the tower and reminded the signalman that he had not thrown his signals to danger behind the Boston train, but Maher insisted on leaving them in the clear position as evidence that he had made no mistake; and the reporters say that for this he was the next day dismissed.

Mr. Vernon, Supervisor of Interlocking, testified that he had confidence in Maher. There are 26 levers in the tower. Officers of the road testified that hand signals to go ahead should not be given out of the window; the man should go down to the ground to give them. The fact that the light on the crossing gate was in line with the windows of the tower had never before been noticed; up to within a few years the trains at this point were run upon the left hand instead of the right hand tracks, so that formerly the confusion of lights could not have occurred.

The lamp on the home signal, which failed to keep alight, was produced at the hearing. It is said that the case had been slightly bent, interfering with the air currents so as to cause the flame to flicker.

The Maria Teresa Floated.

Telegraphic despatches announce that the Spanish armored cruiser Maria Teresa has been successfully floated and taken into the harbor of Guantanamo. This adds an engineering triumph to the brilliant laurels already won by Mr. Hobson. It is said that now he proposes to attack the Colon.

The Sharon Collision.

A Boston correspondent writes: The Massachusetts Railroad Commissioners on Wednesday of this week issued their report on the recent collision at Sharon, Mass. (Aug. 21), which completely confirms the views expressed in the Railroad Gazette last week concerning the question of discipline involved. The report places the entire blame for the accident upon Engineer Getchell, who was in charge of the second section of the train, which was running express and caused the rear-end collision. The report says nothing in regard to the responsibility of any officer of the road in sending an engineman who was only accustomed to a switching engine to run an express, doubtless for the reason that this phase is likely to come before the courts on the question of damages arising from suits brought by the injured. There are no recommendations in the report. This collision was reported in the Railroad Gazette, Sept. 9, p. 654.

Train Robbery Near Kansas City.

On the night of Sept. 23 a westbound passenger train of the Missouri Pacific was stopped by seven masked robbers about seven miles out of Kansas City and the express car was blown to pieces with dynamite. The robbers had first captured the nearest telegraph operator and destroyed his instruments, and before destroying the express car they moved it some distance from the rest of the train. The quantity of dynamite used was so large that the car was literally blown to splinters and both safes were wrecked. Newspaper accounts indicate that the valuables in the safes were probably destroyed by the explosion.

The Hankow-Canton Railroad.

Gen. Parsons informs us that his party is made up to go to China for the examination of the line of railroad for which the syndicate which he represents has a concession, namely, from Hankow to Canton. Mr. Harry Frazier, recently Chief Engineer of the Chesapeake & Ohio, is to go, and has selected one man from his own staff on the Chesapeake & Ohio. Two other men already in the employ of Gen. Parsons have been selected.

Fast Run from Chicago to Omaha.

On Sept. 16 a special train over the Chicago & Northwestern, carrying a number of railroad officers, was run from Chicago to Omaha in 9 hours and 29 minutes. The distance is 493 miles, making the rate of speed 52 miles an hour. There were three stops to change engines, and three others for taking water. At some points the speed rose to 76 miles an hour. To prepare for the run flagmen were stationed at all crossings and special attention was given to all switches. The engine from Chicago to Clinton was No. 928, run by Thomas Rogers; Clinton to Boone, No. 691, run by Roger Hensley; Boone to Omaha, No. 592, run by J. P. Jackson. The train consisted of one passenger car, one sleeper and two private cars.

The Westinghouse-Walker Consolidation.

In addition to what was published last week regarding the consolidation of the two electric companies, Mr. George Westinghouse states that Messrs. Roswell P. Flower and Anthony N. Brady will be included as members of the Board of Directors of the Westinghouse Electric & Manufacturing Co. to represent the interests of the former stockholders of the Walker Co. The purchase by the Westinghouse Co. includes substantially the outstanding stock of all but \$850,000 of the \$2,500,000 of the 20-year bonds of the Walker Co. The Walker Co. now has about \$1,250,000 of unfilled orders, and it is quite probable that

the capacity of the works at Cleveland will be increased. The shipments of both companies exceeded \$750,000 for August. The total fixed charges of the Westinghouse Co., including those resulting from the Walker purchase, and the dividends on its preferred stock, will be \$42,000 a month.

Technical Schools.

The entering freshman class of Stevens Institute numbers 58, which is the same number of students that entered last year.

Armour Institute of Technology, Chicago, began its seventh year on Sept. 22, when the fall term opened with an enrollment much larger than that of any previous year. The total attendance in all branches is now about 1,200. Among the new members of the faculty this year is Prof. J. W. Macomber, formerly of Sibley College, Cornell University, where he has until recently been an instructor in the Department of Electrical Engineering.

Purdue University opened Sept. 14 with the largest freshman class which has been enrolled for several years. This class numbers about 200, nearly two-thirds of whom will take the engineering courses.

Elevated Railroad Cars on the Brooklyn Bridge.

On Tuesday afternoon of this week a change was made in the running schedule of the cars of the Brooklyn Elevated. Hereafter during the rush hours, from six to ten in the morning and from four to eight in the evening, no through cars to and from New York will be in service. During these hours trains will cross the bridge under a minute headway, and passengers will be provided with a duplex ticket for five cents which will entitle them to ride on the bridge on any line of the elevated road with transfer privileges. It is believed that by this new arrangement it will be possible to move 25,000 persons hourly during the rush. Except for the lower fare, the arrangement will be the same as before the plan for running the elevated cars across the bridge was put in execution. During the other hours of the day and night, however, through trains to and from New York will be run as heretofore.

The Toledo Elevator Disaster.

The destruction of the Union Elevator Company's grain elevator at Toledo, O., by an explosion, on the night of Sept. 20, briefly reported in our last issue, involved a loss of about \$560,000, and at last accounts it appeared that 13 persons were killed. The list of dead numbered seven, and six others reported missing are believed to have been burned to death inside the building. Five other persons were badly injured. The whole force was at work in the elevator at the time. The Toledo & Ohio Central Railroad lost a station building and a number of freight cars, the total loss to the railroad company being about \$50,000. Of the Elevator Company's loss \$250,000 represented the building and \$310,000 represented grain. The building was insured for \$136,000, and the grain for \$258,000. Some of the victims in the building were blown out through doors and windows.

The Reading Subway.

Work on the extensive cut and tunnel of the Philadelphia & Reading Railroad in Pennsylvania avenue, Philadelphia, which was begun in 1894, has now progressed so far that it is expected that the subway will be put in use early in 1899. Five of the bridges for carrying streets over the railroad, those at Broad, Fifteenth, Seventeenth, Eighteenth and Nineteenth streets, have been opened for traffic, and one other will be opened soon. The new freight houses on the depressed level at Broad street are so nearly finished that a part of one of them will soon be put in use. There will be a permanent track connecting the high and low levels at Sixteenth street.

The total length of this improvement is nearly two miles; an open subway of 4,180 ft. from Thirteenth street to Twenty-second; a tunnel 2,711 ft. from Twenty-second to Twenty-sixth, and an open subway 2,150 ft. long thence to Thirtieth street. About 1,200 men are now employed on the work. Half of the tunnel is practically finished. The ground above this tunnel will be occupied by an avenue 120 ft. wide. There will be ornamental grass plots in the center, with ornamental trees, and there will be 13 openings for ventilating the tunnel, each opening being about 10 ft. x 48 ft. The foundations of seven large manufacturing buildings standing close to the subway had to be rebuilt.

A "Road Parliament."

On Oct. 8, 1898, at 10 a. m., the National Road Parliament will convene in the Auditorium on the grounds of the Trans-Mississippi Exposition at Omaha, Neb. The objects of this meeting are to awaken and promote a general interest in the improvement of public roads, discuss the best methods of building and maintaining them and to promote good roads legislation. The Governors of the various states are invited to send representatives, as are all public bodies concerned in the subject of roads.

The Lu Kou Chiao-Hankow Railroad.

The following translation of an Imperial decree in regard to the construction of the Lu Kou Chiao-Hankow Railroad has been received from Minister Denby of Peking:

"Some time ago, in connection with the building of the Lu Kou Chiao-Hankow Railroad, a company was formed by merchants, and we appointed Sheng Hsuan-hual Director-General thereof. Two years have now elapsed. A beginning has been made in the work, in so far that the line has been surveyed and land purchased. This railroad involves most important interests, and we do not wish to see the construction thereof delayed. A loan has already been negotiated and Sheng Hsuan-hual is hereby commanded to commence and expedite work at once. He is also commanded to present to us, in a memorial, particulars and details of the work. Should there be any further delay in beginning the building of the line, and any carelessness or neglect shown in this important and essential work, the responsibility will rest with him.

"Let all the officials entrusted with the management of the Canton-Hankow line, the Nankin line and the Shanghai line, in like manner lose no time in commencing work."

The Locomotive a Bee Again.

Two new locomotives, building for the railroad directorate which includes Berlin and Brunswick, are fitted with a front somewhat like the prow of a ship, to diminish the resistance of a head wind.

LOCOMOTIVE BUILDING.

The Florida East Coast has contracted with the Schenectady Locomotive Works for two engines.

We are reliably informed that the Northern Pacific has just given an order for seven more locomotives to the Schenectady Locomotive Works.

The Schenectady Locomotive Works have received the order to build the one engine for the St. Louis stock yards, mentioned in our issue of Sept. 16.

The Lehigh Valley has given an order to the Baldwin Locomotive Works to build one sample engine for use as a helper on the mountain grades near Wilkesbarre.

Bids for the 30 locomotives for the Atchison, Topeka & Santa Fe, referred to last week, were opened at Chicago Sept. 28. It was expected that the contract would be awarded immediately.

The order for one engine for the Wiggins Ferry Co. was placed with the Baldwin Locomotive Works and not with the Cooke Locomotive & Machine Works, as stated by a contemporary last week.

In our issue of June 10 we stated that the Mexican Central would likely order a large number of engines. We now learn that Mr. F. W. Johnstone, Superintendent of Motive Power of the road, is in the United States and will probably place orders for some new equipment while here.

The Boston & Maine has given an order to the Manchester Locomotive Works to build six 10-wheel engines for freight service, similar to those built for the same road last spring. They will be equipped with Hancock inspirators; French springs and Cambria steel (Coffin process), pins and piston rods.

CAR BUILDING.

The Centralla & Chester is having one passenger car built by the St. Charles Car Co.

Murray, Dougal & Co. (Milton Car Works) are building six cars for the Trinity Cotton Oil Co.

The Cincinnati, Portsmouth & Virginia has placed an order with the Ohio Falls Car Mfg. Co. for 25 flat cars.

Pullman's Palace Car Co. is building one car for passenger service for the Richmond, Fredericksburg & Potomac.

The Fitchburg will build 12 new passenger cars at its East Fitchburg shops and is now building 200 flat cars at the same place.

The Ohio Falls Car Mfg. Co. is building six freight cars and seven cars for passenger service for the Louisville, Henderson & St. Louis.

It is reported that the Northern Pacific will order more cars, including some gondolas, but we were unable to get official confirmation at time of going to press.

We are officially informed that the Missouri Pacific has not let a contract for 1,200 cars to the Terre Haute Car & Mfg. Co., as stated by a contemporary last week.

The Columbus, Hocking Valley & Toledo has awarded a contract to the Michigan-Penninsular Car Co. for 250 coal cars, of 60,000 lbs. capacity, for October delivery.

The Delaware & Hudson Canal Co. is considering buying a number of new freight cars, probably 1,500. Orders have been recently given to the Buffalo Car & Mfg. Co. for 350 new cars, as noted in these columns.

The Intercolonial has placed orders as follows for the 400 freight cars mentioned in our issue of Sept. 9: To Rhodes, Curry & Co., Ltd., of Amherst, N. S., for 150 box and 150 flat cars, and to the Crossen Car Mfg. Co., of Cobourg, Ont., for 150 box cars.

We are reliably informed that the Baltimore & Ohio is about to order 1,000 more box cars, and is considering buying a number of steel cars. It is rumored, but not confirmed, that a large number of freight cars will be ordered by this road as soon as the reorganization is completed.

The 400 coal and 150 flat cars ordered by the Kansas City, Pittsburgh & Gulf, and referred to last week, will have steel axles, Detroit springs and More, Jones & Co.'s brasses, in addition to the equipment mentioned. The cars will weigh 29,000 lbs each, and be 34 ft. long and 8 ft. 9 in. wide.

The Pennsylvania has ordered 2,000 Class G I cars of 80,000 lbs. capacity, dividing the contracts as follows: Jackson & Woodin, 500; Murray, Dougal & Co. (Milton Car Works), 200; Michigan-Penninsular Car Co., 300; Terre Haute Car & Mfg. Co., 400; Union Car Works, 300; Middletown Car Works, 100; Lebanon Car & Mfg. Co., 100 and Erie Car Works, 100.

The Chesapeake & Ohio will build at its own shops 100 60,000-lbs. capacity coke cars, to be equipped with five or six different kinds of trucks. It is the intention to test the different trucks in the same service, and it is understood that plenty of time will be given the makers of the trucks in order that they may be able to furnish the best possible samples.

According to the Honolulu (H. I.) Advertiser, the Oahu Railway & Land Co. is building 10 box and 10 flat cars at its own shops and proposes to build a number of first-class passenger coaches. Some new machinery has lately been bought in the United States, and the railroad company intends to build miscellaneous cars for use in Hawaii. An order has been booked for 200 can cars, and the company is endeavoring to obtain the job of building cars for new street railroads.

The Quincy (Ill.) Street Railroad has ordered six new closed cars from Pullman's Palace Car Co., which will be finished and equipped according to the best modern practice. The road will order more cars next spring.

The Newburyport Car Mfg. Co. has had more orders than it could fill this season. Among them were 22 open cars for the Lynn & Boston, eight vestibule and 15 open cars for the Fall River & Newport, four for the Salem & Wakefield, 40 vestibule cars for the Worcester, Marlboro & Framingham, eight vestibule cars for the Union Line of Providence, and six for the Plum Island road. The company was compelled to turn over an order for 21 cars for the Providence & Taunton road to the St. Louis Car Co.

BRIDGE BUILDING.

CINCINNATI, O.—Bids will be received by the Commissioners of Hamilton County until Oct. 8, for building the superstructure and approaches of a bridge over Great Miami River, at New Baltimore, and also for a bridge and approaches on Glass road, Crosby township. Eugene L. Lewis, Auditor.

FITCHBURG, MASS.—The Superior Court has appointed Frank P. Goulding and C. A. Allen, of Worcester, and J. H. Read, of Westford, Commissioners to decide the details of bridges to be built over the Fitchburg Railroad.

GALT, ONT.—The city has voted \$12,000 for bridge repairs.

GALVESTON, TEX.—It is stated that a bridge will be built at Franklin Ave., at a cost of about \$20,000.

JACKSON, CAL.—The Supervisors of Amador County granted the petition of R. C. Rust et al. for a bridge over Sutter Creek. Further proceedings will be taken at the regular meeting of the Board in October.

LEWISTON, WASH.—Work will begin on the Snake River bridge about Oct. 1. The specifications call for a bridge 1,685 ft. long, 56 ft. above high water mark over the navigable channel. This channel will be crossed by a cantilever span 374 ft. in the clear. There will be 12 spans. The estimated cost is \$80,000. The site of the bridge is on Snake River avenue, north of Main street.

LITTLE ROCK, ARK.—There is a probability that a bridge will be built across the Arkansas River by the Choctaw, Oklahoma & Gulf. (See Railroad Construction column.)

MINNEAPOLIS, MINN.—An effort will be made by the South Minneapolis Commercial Club to have the Legislature make an appropriation for a bridge over the river between Tenth and Cedar Aves. W. E. Brown is the President of the Club.

NEWPORT NEWS, VA.—Bids were opened Sept. 19 for the overhead bridges at the intersection of Twenty-fifth and Thirty-fourth streets, and the Chesapeake & Ohio RR. The bids ranged from \$31,219 for both viaducts, to \$44,260. The lowest bid was by the Structural Iron Co. of Baltimore, Md., on plans of their own. The bids will be submitted to an expert, who will decide upon the merits of the plans and recommend the bid which seems to provide the best bridges for the least money. The appropriation for the work made by the City Council is \$40,000.

NIAGARA FALLS, N. Y.—City Engineer Jones reported to the City Council at a recent meeting that he had received several communications from Division Superintendent C. A. Brunn of the Erie urging that something be done in regard to the Pine Ave. overhead crossing. The Erie and the Niagara Falls & Suspension Bridge St. Ry. Co. will each pay a third of the cost of the bridge. It is the opinion of the City Engineer that it will cost about \$8,500.

The City Attorney is in correspondence with the New York Central in regard to building an overhead crossing at Sixth St. The work would cost over \$30,000.

OMAHA, NEB.—The City Engineer, Mr. Andrew Rosewater, is sending a circular letter to all who ask for data relating to the proposed viaducts, ordered by the City Council to be built. The circular says:

Under the provisions of the Omaha city charter, requiring railroad companies to build viaducts required by public travel over their line of railroad, the engineering department of the city is required to make plans and general specifications for such work, and, after such plans and specifications shall have been approved by the Mayor and City Council, the railroad companies will be officially notified to proceed with the construction of the same. These viaducts will, therefore, be paid for by the railroad companies and built by them. They will, doubtless, under joint arrangement, solicit bids for such construction. The city has nothing to do with receiving bids for this work, unless the companies shall refuse to proceed with such construction. In the latter event, the city will advertise and give due notice to all parties who contemplate submitting proposals, and furnish plans and specifications therefor. The viaduct now building is known as the Sixteenth Street Viaduct. It is about 1,600 ft. long, including approaches, and will range from 20 ft. to 40 ft. above the streets and tracks. Plans and specifications will probably be submitted to the Mayor and City Council about Oct. 1, and, after being approved, the railroad companies will be officially notified to proceed with the work.

PETERBOROUGH, ONT.—The Street and Bridge Committee has been authorized to invite bids for iron bridges over the creek on Sherbrooke, Dalhousie, Donegal and Smith streets.

PLACERVILLE, CAL.—Bids will be received until Oct. 4 for a combination bridge, with a span of 85 ft., to be built across the Middle Fork of the Cosumnes River, at Beachers Bar. A. S. Bosquit, Clerk, Eldorado County.

SAN ANTONIO, TEX.—The Chicago, St. Louis & Texas Air Line will build bridges. (See Railroad Construction column.)

TOPEKA, KAN.—The Commissioners of Shawnee County will build two bridges, one across Deer Creek, the other across Soldier Creek.

TOWNSEND, MASS.—It is reported that a bridge will be built at Townsend, to cost about \$2,500.

WESTFIELD, MASS.—Bids will be received until 2 o'clock, Oct. 3, for the superstructure of the bridge over Little River at Main St. Orrin A. Granger, Chairman of Bridge Committee. O. E. Parkes, Town Engineer.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Chartiers.—Five per cent., payable Oct. 1.
Chicago, Rock Island & Pacific.—Quarterly, 1¼ per cent., payable Nov. 1.
Cincinnati, Hamilton & Dayton.—Quarterly, preferred, A & B, 1 per cent., payable Oct. 4.
Dayton & Michigan.—Quarterly, common, 1¼ per cent., payable Oct. 1; quarterly, preferred, guaranteed, 2 per cent., payable Oct. 4.
Norfolk & Southern.—Quarterly, 1 per cent., payable Oct. 10.
Pittsburgh, Wheeling & Kentucky.—Three per cent., extra 3 per cent., payable Oct. 1.
Union Pacific.—Preferred, 1¼ per cent., payable Oct. 1.

Utica & Black River.—Guaranteed, 3½ per cent., payable Sept. 30.
Waynesburgh & Washington.—Two and one-half per cent., payable Sept. 15.

Capitol Traction (Wash., D. C.).—Quarterly, ¼ per cent., payable Oct. 1.
Cleveland Electric Ry.—Quarterly, 1 per cent., payable Oct. 1.
Interstate (N. Attleboro, Mass.).—Quarterly, 1½ per cent., payable Oct. 1.
Lynn & Boston.—Four per cent., payable Sept. 30.
Newton & Boston.—Quarterly, 1¼ per cent., payable Oct. 1.
Newtonville & Watertown (Mass.).—Quarterly, 1 per cent., payable Oct. 1.

Firemen's Brotherhood.

The Brotherhood of Locomotive Firemen held its general meeting at Toronto, Ont., last week. Grand Master F. P. Sargent was re-elected, and John J. Hannahan was elected First Vice Grand Master. The Secretary is F. W. Arnold, Peoria, Ill., and the editor of the magazine is T. Carter.

Western Society of Engineers.

A meeting of the Western Society of Engineers was held Wednesday evening, Sept. 23, in the Society rooms, Monadnock Block, Chicago. Mr. William Sooy Smith presented a paper entitled "The Foundations of the U. S. Government Post Office at Chicago." Mr. Sooy Smith was the contractor for these foundations, and so was able to give an interesting account of the work.

The Entertainment Committee of the Western Society of Engineers announce that arrangements are being made for an excursion to the Omaha Exposition. If it is found that a sufficient number of members will go, a special train of sleeping, dining and baggage cars will leave Chicago Friday evening at 6 p. m., either Oct. 7 or 14, and return so as to be in Chicago the following Monday morning, thus giving two full days for visiting the Exposition. It is proposed that the train be placed near the Exposition grounds and be at the disposal of the party during the entire stay at Omaha, meals being served on the train. The cost of the trip, including railroad fare, sleeping cars, meals and admission tickets to the Exposition will be about \$20 for each person. The Entertainment Committee requests that the members advise it as soon as possible whether or not they will go to Omaha, and which date, Oct. 7 or 14, will be the more convenient.

Engineers' Club of St. Louis.

The 475th meeting was held Sept. 21, with President Bryan in the chair. Nineteen members and seven visitors were present.

The President addressed the Club, stating that as the meeting was in memory of the late Col. Flad, all routine business would be dispensed with. He stated that the engineer seldom accumulates wealth and that communities seldom erect monuments to his memory, but that his monuments consist in the structures which are erected by him and in the esteem of his fellow engineers. He referred to the close connection of Col. Flad with the Engineers' Club of St. Louis, and introduced Mr. Robert Moore as the principal speaker of the evening. [See the memoir signed R. M. in the Railroad Gazette of July 1.] The club was then addressed by Dr. C. M. Woodward, Mr. Julius Pitzman, Prof. J. B. Johnson, Mr. B. H. Colby and Mr. Albert Borden, each of whom treated of some event in the life of Col. Flad or some phase of his character.

Engineers' Club of Philadelphia.

A business meeting of the club will be held on Saturday, Oct. 1, at 8 o'clock p. m. The paper will be on the Dow engine (Corliss foundation) and the chronometric governor. Illustrated. By Josiah Dow.

It is intended to resume the conversational meetings on the second Saturday of each month during the ensuing session. The first meeting of this character will be on Oct. 8. A programme is being arranged, and will be announced at the stated meeting of Oct. 1.

At the regular meeting of Sept. 17, 1898, the topical discussion was on the proper proportions of parts of steam engines, participated in by Messrs. J. H. Vail, Francis Schumann, Josiah Dow, James Christie, H. C. Lüders, W. C. L. Eglin, E. M. Nichols, Edgar Marburg, William H. Robinson and others. The opinion of the majority seemed to be that it would be very desirable if standard proportions could be adopted for the various parts of steam engines intended to furnish standard amounts of horse-power in different classes of service, but that this would only be possible by adopting standards for the quality of materials employed.

Western Railway Club.

A meeting of the Western Railway Club was held Tuesday afternoon, Sept. 20, at the Auditorium Hotel, Chicago. The names of 30 new members were read, whose applications had been favorably considered by the Directors. It was decided to hold the annual banquet at the time of the October meeting.

Mr. G. W. Scott of the Pullman Co., read a paper entitled, "Heating Large Railroad Stations, Shops and Buildings," which was followed by considerable discussion. Mr. Scott favored for buildings the low-pressure, return system of steam heating where the steam was supplied by the exhaust from engines and pumps, and the circulation through the heating system maintained by a vacuum pump. He further suggested that the application of such a system to passenger cars using the exhaust steam from the locomotive would result in marked improvements over present methods. This would enable cars to be heated with steam somewhat below atmospheric pressure, in place of using steam pressures ranging from 20 to 100 lbs. per sq. in. The discussion brought out considerable information about the different systems of heating now in use for buildings, from which it would appear that the failure of the low-pressure return system in certain cases has been largely the result of poor engineering and improper installation.

The topical discussion of the question, "The economy of, and limitations in running locomotives long distances," was opened by Mr. John Mackenzie. He held that there was no advantage in long, continuous runs, and that about 150 miles was as far as it was advisable to go without cleaning the fires where soft coal of average quality was used. A greater saving could be obtained by using blow-off cocks and not washing out boilers. On the New York, Chicago & St. Louis, locomotives are now run about 8,000 miles

between boiler washings. Other members, while agreeing as to the possible economy of less frequent washing of boilers, disagreed with Mr. Mackenzie about the distance which could be run without cleaning the fires. Mr. J. F. Deems of the Chicago, Burlington & Quincy stated that on a certain passenger run the locomotives made over 300 miles without having the fires cleaned, and that at the end of this run the fire was usually in good condition. Mr. W. H. Marshall said that, where the coal tended to form clinkers, the Chicago & Northwestern was using special tongs with which the fireman could remove clinkers through the fire door before they became too large. In this way it had been possible to keep the fire clean and to lengthen the runs in certain districts where the coal was bad. The consensus of opinion seemed to be that it was economical to run locomotives as long distances as the local conditions and the time table would warrant.

Mr. A. M. Waitt opened the discussion of the question, "Is it practical, safe and economical to use spliced air brake hose?" and gave some of the results of his investigations. Other members spoke in favor of using spliced hose, and then a motion was passed that it was the sense of the meeting that splicing air brake hose was good practice and that cars fitted with spliced hose should be received in interchange. The next meeting will be held Tuesday, Oct. 13, when Mr. Peter H. Peck, Master Mechanic of the Chicago & Western Indiana, will present a paper, "The M. C. B. Coupler."

Institute of Mining Engineers.

Dr. R. W. Raymond, Secretary, announced that the seventy-fifth meeting of the Institute will be held at Buffalo, N. Y., beginning Tuesday evening, Oct. 13, 1898. The proposed trip to Omaha after the meeting has been given up. Hotel headquarters at Buffalo will be at the Iroquois Hotel, and at Niagara Falls at the International. The opening session will be held at the Buffalo Library Building, followed by an informal reception. Sessions will be held in the forenoon on Wednesday and Thursday, and on Thursday afternoon at the Iroquois Hotel. Wednesday afternoon there will be a steamer excursion about the harbor; Thursday evening a reception will be given at the Ellicott Club. Friday morning and afternoon will be devoted to optional excursions. The Local Committee will provide guides for parties organized at headquarters to visit many suggested places of interest. At 5 p. m. on Friday the Institute party will proceed by train to Niagara Falls, where a final session will be held Friday evening at the International Hotel for the presentation of an illustrated paper on the Niagara Falls water-power and its transmission and utilization. On Saturday the Falls, the powerhouse and other points of interest at Niagara will be visited, and in order to accommodate those who may wish to remain over Sunday, the International Hotel will be kept open.

The following papers have been prepared up to this time, some of which will be sent to members before the meeting, others will be distributed at the meeting, and still others will be read or presented by titles at the different sessions:

"The Evolution of Mine Surveying Instruments," by Dunbar E. Scott.
"Note on the Forms Assumed by the Charge in the Blast Furnace, as Affected by Various Methods of Filling," by Frank Firmstone.
"Modern Cupola Practice, with Special Reference to the Physics of Cast Iron," by Bertrand S. Summers.
"Experiments in the Sampling of Silver-Lead Bullion," by G. M. Roberts.

"The Influence of Bismuth on Brass, and Its Relation to Fire Cracks," by Erwin S. Sperry.
"Graphic Records of the Screening of Crushed Material," by Courtenay DeKalb.
"Notes on the Mines of the Frontino & Bolivia Company, Colombia, S. A.," by Spencer Cragoe.
"The Relations Between the Chemical Constitution and the Physical Character of Steel," by William R. Webster.

"Does the Size of Particles Have Any Influence in Determining the Resistance of Fire Clays to Heat and to Fluxes?" by H. O. Hoffman and B. Stoughton.
"A Modification of Bischof's Method for Determining the Fusibility of Clays, as Applied to Non-Refractory Clays, and the Resistance of Fire Clays to Fluxes," by H. O. Hoffman.

"The Superficial Alteration of Western Australian Ore Deposits," by Herbert C. Hoover.
"Mineral Lode Locations in British Columbia," by William Braden.

"The Kytchym Medal," by Dr. Persifor Frazer.
"A New Assay for Mercury," by Richard E. Chism.
"The By-Product Coke Oven in Some of Its Phases," by W. H. Blauvelt.

"The Alluvial Deposits of a Dry Country," by T. A. Rickard.
"Hübnert in Arizona," by William P. Blake.

Discussion of Prof. Howe's paper on the "Use of the Tri-Axial Diagram and Triangular Pyramid for Graphical Illustration."

Discussion (continued) of Dr. Don's paper on the "Genesis of Ore Deposits."

Discussion (continued) of Mr. Keller's paper on the "Elimination of Impurities from Copper Mattes."

Discussion on the use of multiple tuyeres for the blast furnace.

PERSONAL

—Mr. Thomas Collins, a member of the firm of Collins Bros., railroad contractors, died in Bellefonte, Pa., at the age of 75. The firm built portions of the Philadelphia & Reading, Lehigh Valley and Central of New Jersey.

—Mr. M. F. Bonzano, who recently resigned as Superintendent and Chief Engineer of the Columbus, Sandusky & Hocking, became connected with the road in July, 1897, as General Agent for Receiver Felton. Previous to his appointment Mr. Bonzano was General Manager of the Chattanooga Southern, with headquarters at Chattanooga, Tenn.

—Mr. F. F. Whittekin, C. E., has been made Consulting Engineer and Technical Director of the Autioquia Government Railroad, United States of Colombia. His office is at Medellin. He has charge of all location surveys and bridging, and the superintendence of motive power, machinery and rolling stock; and is chief of all departments of operation. Mr. Whittekin was for some time connected with the Denver & Rio Grande, the Western New York & Pennsylvania, and the Pennsylvania, and afterward was Consulting Engineer for several roads in this country. He was Chief Engineer of the Autioquia Railroad at the time of his promotion.

—Mr. John M. Toucey, recently General Manager of the New York Central & Hudson River Railroad, died at his home at Garrison's, Friday evening, Sept. 23. He was buried on Monday of this week in the pres-

ence of a great throng of people, which included many of the most prominent railroad men of the country. His pallbearers were Samuel Sloan, William Buchanan, E. V. W. Rossiter, James E. Taylor, Charles E. Pugh, George Westinghouse, Theodore N. Ely, Walter Katté and C. C. Clarke. Mr. Toucey retired from active service as General Manager in May last. At that time we wrote a brief notice of his career, which will be found in the Railroad Gazette of May 13, page 347. Mr. Toucey was a remarkable man, and honorably and successfully filled a very important place in the railroad world for many years. He was a man of great energy and resolution, full of activity and fire, strong and confident, and yet with a singular gentleness and sweetness of manner. He wrote very little beyond his personal and official correspondence, and he hardly ever spoke in public, and he was always reluctant to appear in conspicuous positions. The result is that his personality was known to but comparatively few men, those who by the circumstances of life were thrown with him; but those who knew him best appreciated him most highly. With him passed away a vast store of knowledge of many of the most important circumstances of the building up of the railroad system of the United States. It had long been our hope to be able some time to avail ourselves of his memory and of his manuscript notes to write a little chapter of American railroad history, but that project is now impossible of fulfillment. Perhaps, however, there are others who have been close to Mr. Toucey for many years, and who can command the documents and records which he left behind, who will be disposed to write a biography or memoir of him. We must be content now to simply record the passing away of this noble man and good friend.

ELECTIONS AND APPOINTMENTS.

Alabama Great Southern.—W. F. Patillo, Jr., who was recently appointed Commercial Agent of the Georgia & Alabama, has resigned to become Commercial Agent of the A. G. S. at Atlanta, Ga. His appointment took effect Sept. 16. (Sept. 23, p. 697.)

Atlantic & North Carolina.—At a meeting of the stockholders, held in Raleigh, N. C., Sept. 22, Claude Foy was elected a Director in place of Thos. C. Daniel; H. Well in place of John L. Morehead, and Carl Duncan in place of N. M. Jurney. The Governor appointed W. P. Exum a Director in place of W. H. Chadbourne, Jr.

Baltimore & Ohio.—C. E. Adams, Chief Train Dispatcher at Newark, O., has resigned. He is succeeded by H. S. Fordyce.

Joseph Wilkins, Supervisor at Wilmington, Del., has been transferred to a similar position, with headquarters at Baltimore, Md.

Baltimore & Ohio Southwestern.—The office of Assistant to the Purchasing Agent, held by Frank Brown, promoted, has been abolished. (Sept. 16, p. 678.)

Bellingham Bay & British Columbia.—J. J. Donovan, Vice-President and General Superintendent of the Bellingham Bay & Eastern, will, in addition to his present duties, assume those of the General Superintendency of the B. B. & B. C., with headquarters at New Whatcom, Wash. C. L. Anderson has been heretofore General Superintendent, Chief Engineer and Purchasing Agent of this road.

Black Diamond.—At the meeting held at Vincennes, Ind., Sept. 22, the following officers were elected: President, Edward Watson, Vincennes; First Vice-President, James S. McCoy; Second Vice-President, John L. Bretz; Secretary, Joseph Lebeur, of Vincennes; Treasurer, Amos Stout, Paoli, Ind.; General Counsel, W. A. Cullop. (See Construction Column.)

Boston & Albany.—John Lindsey, Trainmaster at Springfield, Mass., has resigned. He is succeeded by W. W. Pingree, with headquarters at the same point. Mr. Lindsey has been connected with the B. & A. for nearly 40 years.

Canadian Pacific.—B. W. Greer, General Agent at Portland, Ore., has been transferred to Victoria, B. C., as General Agent.

Central of Georgia.—W. T. Sutphen has been appointed Train Dispatcher at Savannah, Ga., succeeding Z. Middlebrooks.

H. B. Crawford has been appointed Trainmaster of the Fourth Division, with headquarters at Columbus, Ga. He was formerly Supervisor at Fort Valley, Ga.

Central of New Jersey.—L. L. Hulshizer, heretofore First Train Dispatcher and Division Operator, Mauch Chunk, Pa., has been appointed Assistant Trainmaster at the same point, succeeding William Dods, promoted. (Sept. 16, p. 673.)

Chesapeake & Ohio.—U. L. Truitt, Northwestern Passenger Agent at Chicago, has been appointed General Eastern Agent at 362 Broadway, New York. W. E. Conklyn, Traveling Passenger Agent at Cincinnati, has been appointed Northwestern Passenger Agent, succeeding Mr. Truitt. A. L. Ellett will succeed Mr. Conklyn as Traveling Passenger Agent.

Chicago, Milwaukee & St. Paul.—W. C. Brown, who was heretofore located at Pittsburgh, has been appointed Commercial Agent at Cleveland, O., succeeding W. W. Hall. (Sept. 16, p. 678.) H. G. Lampman has been appointed Traveling Freight Agent at Pittsburgh, succeeding Mr. Brown.

W. B. Keith has been appointed District Freight and Passenger Agent, with headquarters at Jacksonville, Fla. His jurisdiction will cover the states of North Carolina, South Carolina, Georgia and Florida.

Chicago, Rock Island & Pacific.—T. O. Jennings has been appointed Contracting Freight Agent, with headquarters at Kansas City.

Cleveland, Cincinnati, Chicago & St. Louis.—T. S. Bunn has been appointed Trainmaster, with headquarters at Danville, Ill.

C. M. Saffarans, heretofore Agent of the White Line at St. Louis, has been appointed General Western Freight Agent at Kansas City, Mo., succeeding W. W. Root, resigned. (Sept. 23, p. 695.)

Columbus, Hocking Valley & Toledo.—O. S. Bressler has resigned as Chief Train Dispatcher of the Toledo Division at Columbus, O. He is succeeded by

C. O. Barnhouse, Second Train Dispatcher, who in turn is succeeded by John McMahon.

Columbus, Sandusky & Hocking.—M. F. Bonzano, Superintendent and Chief Engineer at Columbus, O., has resigned. He is succeeded by G. H. Kimball. Mr. Kimball was formerly connected with the New York, Chicago & St. Louis as Superintendent of the Eastern Division.

Commercial Express.—W. W. Kugler has been appointed Contracting Agent, with headquarters at 401 Broadway, New York. He succeeds C. W. TenBroeck.

Fitchburg.—At a meeting of the Board of Directors, held in Boston Sept. 22, Wm. E. Rice was elected a Director in place of the late E. C. Thayer.

Georgia & Alabama.—R. C. Hicks has been appointed Commercial Agent, with headquarters at St. Louis, succeeding R. D. Sterne.

Grand Trunk.—A. Begg, heretofore Trainmaster at Stratford, Ont., has been transferred to Sarnia, Ont., where he will act for the G. T. R. at Sarnia and the Chicago & Grand Trunk at Port Huron, Mich., opposite Sarnia.

Trainmaster H. E. Whittenberger succeeds Mr. Begg at Stratford. He was heretofore Trainmaster of the Northern Division, with headquarters at Stratford, Ont.

P. J. Lynch has been appointed Trainmaster of the Northern Division, succeeding H. E. Whittenberger, with headquarters at Stratford. Mr. Lynch was heretofore a conductor.

Great Northern.—G. R. Martin, Assistant Superintendent at Larimore, N. D., has resigned. The jurisdiction of J. M. Gruber, Assistant General Superintendent of the Eastern District at St. Paul, has been extended over the Dakota Division.

Houston & Texas Central.—W. T. Torey, Chief Clerk in the Car Accountant's office, has resigned. He is succeeded by E. H. Hughes.

Indiana Stone.—The first annual meeting of this company, referred to in the Construction Column, was held in Bloomington, Ind., Sept. 21. The following were elected Directors: Samuel Thomas and E. R. Thomas, of New York; G. B. Shaw, C. H. Rockwell, B. E. Taylor and E. C. Field, of Chicago; W. W. Wicks, of Bloomington. Gilbert B. Shaw of Chicago was elected President.

Kanawa & Michigan.—J. W. Dawson, who has been Superintendent for the past eight years, with headquarters at Charleston, W. Va., has resigned, to become General Manager of the Kelleys Creek Mining Co., with headquarters at Mammoth, W. Va.

Kansas City, Pittsburgh & Gulf.—H. J. Hargrave, heretofore Traveling Freight Agent, Northern System, at Maryville, Mo., has been appointed Chief Clerk to Assistant General Freight Agent M. L. Scoville, at Shreveport, La. The offices of Traveling Freight Agent and Live Stock Agent have been consolidated, the Live Stock Agent, J. R. Snodgrass, assuming the duties of both positions. (Sept. 16, p. 678.)

H. Visscher has been appointed Cashier and Paymaster, succeeding Mr. Howe, who will assume the duties of Assistant Treasurer.

Leavenworth, Kansas & Western.—A. Swanson has resigned as Roadmaster. He is succeeded by P. R. Walsh, with office at Leavenworth, Kan.

Lowell & Hastings.—Wm. H. Clark, Traffic Manager, has been appointed General Manager in addition to his present duties. His headquarters are at Lowell, Mich.

Mexican Central.—J. H. Greenwell has been appointed Trainmaster at San Luis Potosi, Mexico, succeeding C. B. Jewell, resigned. (Sept. 23, p. 696.)

A. P. Blozier has been appointed City Passenger and Ticket Agent at Buffalo, succeeding W. H. Leslie, resigned.

Missouri, Kansas & Texas.—F. J. Snavelley has resigned as Traveling Freight Agent at Houston, Tex., to become Freight Agent at the same point. He succeeds T. F. Patterson, resigned. Mr. Snavelley has been succeeded by O. P. Gatlin, with headquarters at same point. (Sept. 9, p. 655.)

Mobile & West Alabama.—At a meeting of the Directors held recently, Chas. M. Shelley of Birmingham, Ala., was elected a Director to fill the vacancy caused by the death of the Hon. John T. Milner.

Nashville, Chattanooga & St. Louis.—H. W. Woolf, heretofore Freight Auditor of the Southern at Washington, D. C., has been appointed Chief Freight Claim Clerk, with headquarters at Nashville, Tenn.

New Orleans & Northeastern.—E. D. Wolfe, Commercial Agent at Dallas, Tex., has resigned.

Norfolk, Virginia Beach & Southern.—W. T. McCullough has been appointed General Manager, with headquarters at Norfolk, Va.

Oregon Railroad & Navigation Co.—Wm. L. Bull was elected Chairman of the Board of Directors in place of A. S. Heidelberg. The annual meeting was held Sept. 1, at Portland, Ore.

Plant System.—D. F. Kirkland, heretofore Chief Dispatcher, First and Fourth divisions at High Springs, Fla., has been appointed Trainmaster of the same divisions and at the same point.

St. Louis Southwestern.—Geo. W. Barnhart has been appointed Assistant General Freight Agent, with headquarters at St. Louis, Mo. Mr. Barnhart was heretofore General Freight Agent of the St. Louis Southwestern of Texas, and Tyler Southeastern, with headquarters at Tyler, Tex. He succeeded H. E. Farrell, who is transferred to the position vacated by himself. (Sept. 23, p. 696.)

Southern.—C. B. Hayes has been appointed Acting Freight Auditor in place of H. W. Woolf, resigned.

Tennessee Northern.—A. A. Glasier has been elected President, succeeding H. M. La Follette, who has been elected Vice-President. Mr. Glasier's headquarters are at Boston, Mass. L. C. Bradley has been appointed General Freight and Passenger

Agent, succeeding F. W. Rogers, with headquarters at La Follette, Ind.

Texas & Pacific.—C. P. Fegan has been appointed Chief Clerk to General Passenger Agent E. P. Turner, with headquarters at Dallas, Tex. Mr. Fegan was heretofore Traveling Passenger Agent of the Baltimore & Ohio Southwestern at Dallas.

Union, Cove & Valley.—The officers of this company, referred to in the Construction Column, are: President, A. P. McDaniel, Cove, Ore.; Vice-President, L. B. Rinehart, Union, Ore.; Secretary and Treasurer, J. G. Stevens, Cove. The Directors in addition to the above are Joseph Johnston, P. J. Taylor, H. H. French and C. F. Kennedy.

Union Pacific.—E. V. Maze, General Agent at Butte, Mont., has resigned. He is succeeded by Chas. Clifford, heretofore Chief Clerk in the General Freight offices at Omaha.

C. E. Sechrist has been appointed Private Secretary to Freight Traffic Manager J. A. Munroe at Omaha, Neb., succeeding Chas. Clifford. T. M. Schumacher, General Agent of the U. P. and the Oregon Short Line at San Francisco, Cal., has resigned. He has been appointed Vice-President of the Continental Fruit Express, in charge of operating and traffic, with headquarters at Los Angeles, Cal. The appointment takes effect Oct. 1.

Wabash & Lackawanna.—C. W. TenBroeck has been appointed New York Agent, at 429 Broadway. The New York agency was created Sept. 1. Mr. TenBroeck's former position was that of Contracting Agent of the Commercial Express. The Wabash & Lackawanna has been operating eastbound for some time, and the establishment of the New York office is the result of an effort to secure westbound tonnage.

Wisconsin Central.—J. J. O'Hara has been appointed Traveling Freight Agent, with headquarters at Cincinnati, O., to succeed A. W. Thomas, who goes to Cincinnati, O., with the Central of Georgia. (Sept. 16, p. 678.)

York Southern.—John S. Bull, General Passenger and Freight Agent, with headquarters at Baltimore, Md., has resigned. The duties of the office have been assumed by S. M. Manifold, General Manager and Chief Engineer at York, Pa.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

ATLANTA & WEST POINT.—Press dispatches state that this company is soon to begin building a belt line around the east side of the city of Atlanta. It will start at a point 2,000 ft. beyond the city limits, between West End and Fort McPherson, and will run near the city limits for about six miles, connecting with the Georgia. It will require five or six bridges and one tunnel to run under the Southern. The estimated cost is \$200,000.

ATLANTIC COAST LINE.—The line between Petersburg and Stony Creek, on the Petersburg Division, is to be built between the fourth and sixteenth mile posts. (Sept. 16, p. 678.) Work is already begun. The contractors are Phillips, Wright & Co., Richmond, Va. There are no bridges and the work is generally easy. (Official.)

BALTIMORE & OHIO.—The divisions west of the Ohio River will receive the same sort of improvements that have been made on the lines east of the Ohio. The grades are to be reduced wherever it is practicable, and heavier motive power will be introduced. To carry the additional weight, the bridges on all the divisions are being replaced with heavier structures and the track relaid with heavier steel rail. It is expected that within two years the road will be an 18-ft. grade road from Chicago to Baltimore, with the exception of that portion which passes over the mountains. It is understood that the policy of rehabilitation adopted by the Receivers two years ago will be continued by the new company after the reorganization.

BLACK DIAMOND.—Sir Thomas Tancred, representing British capital, is reported to be inspecting the line of this proposed road, with a view to buying the franchises and property. This road is projected to run through Indiana, Kentucky, Tennessee, North and South Carolina and Georgia, with branches through Ohio, Kentucky, Indiana and Illinois, including over 1,000 miles. This is the project of Albert E. Boone of Dover, Ky., and has been under consideration for a number of years. (Sept. 22, p. 538.)

BRAINERD & NORTHERN MINNESOTA.—Grading is reported completed for 23 miles on the extension of this line from Walker, Minn., northwest 30 miles to Lake Bemidji. Rails are laid six miles out from Walker. A. Guthrie & Co. of St. Paul, Minn., have the contract. (Sept. 2, p. 638.)

CAMMAL & BLACK FOREST.—This company is building eight miles of new line this year, of which 4.5 miles is to run from Pump Station, Pa., east toward Slate Run, and 3.5 miles from Pump Station west toward the Susquehanna River. (June 3, p. 399.) On the line east the grading is all done and all the rails laid but about one-half mile. Grading is to begin this week on the extension west. All the work is being done by the company and about 30 men are employed. (Official.)

CANADA ATLANTIC.—The railroad from Egan Estate, Ont., to McLaughlin Lake, about five miles (Sept. 9, p. 656), is being built by J. R. Booth of Ottawa. It is a lumber road and a private enterprise. (Official.)

CANADIAN PACIFIC.—Wm. Whyte, manager of the Western lines, states that he expects to see the Crow's Nest Pass RR turned over to the company for operation about Oct. 1. By that time the railroad will be completed between Lethbridge, N. W. T., and Kuskonook on Kootenay Lake. Kuskonook, for the present, will remain the railroad terminus, and from this point fast steel steamers will carry passengers and freight to the Columbia & Kootenay and the Columbia & Western lines of the C. P. R. Mr. Whyte was not prepared to say whether the Crow's Nest Pass road would be extended westward by way of Salmo, Seyward and Trail, but this route has been surveyed and found to be practical. No time will be lost in establishing a delivery for Crow's Nest Pass coal and coke to points in West Kootenay, and Mr.

Whyte hopes to see this coal landed in large quantities at Columbia River points by next month. (Sept. 23, p. 696.)

To avoid congestion of traffic between Toronto and Montreal, the C. P. R. has begun double tracking this portion of their system. The distance between the two points is 339 miles. The first section is already under way between Jacques Cartier's crossing, a mile from Montreal Junction, to St. Ann's, Que., the length of this stretch to be double tracked being about 14 miles. In speaking of the work, Thomas Tait, Manager of the lines east of Ft. William, Ont., is reported to have said that the work would be pushed as fast as possible. At the annual meeting of the stockholders this improvement was authorized.

The improvements to the Simcoe street yard in Toronto, Can., have been completed and the yard is now ready for use. Three new sidings have been laid, which will make accommodation for five full trains.

CANADIAN ROADS.—The Fort Steele, N. W. T., Prospector, announces the application for a charter for a railroad to connect with the Crow's Nest Pass Line of the Canadian Pacific at some point between Wardner and Elk River, to run up the east side of the Kootenay River, to Windermere, thence west to cross the river and up Toby Creek, then over the Selkirk Range to the foot of Lake Duncan, thence up the Lardo River to Trout Lake, and from there northwest in as direct a line as possible to the Revelstoke Branch of the C. P. R.

CHICAGO, MILWAUKEE & ST. PAUL.—This company is making a survey in Clark County, Wis., for a connection between its line and the Wisconsin Central, but it is not yet determined whether the company will build. (Official.)

CHICAGO, ST. LOUIS & TEXAS AIR LINE.—Two surveys are completed for this proposed line from San Antonio, Tex., south 273 miles via Pleasanton, Tilden and San Diego to Brownsville. (Oct. 22, p. 755.) The company is looking for contractors who will take 30 miles of grading, the material furnished, or grading for the whole distance with material furnished for 30 miles, the work to be paid for upon completion. Grading will be very easy, requiring very little rock-cut. There will be two or three bridges. Bids will be received for 45 to 65-lb. rails for 30 to 50 miles, or for the whole line. (Official.) D. Griffin Gunn of San Antonio, Tex., is President.

CHOCTAW, OKLAHOMA & GULF.—Surveys are reported in progress for the Choctaw & Memphis extension between Wister Junction, Ind. Ter., and Little Rock. It is stated as probable that the road will enter Little Rock from the south side of the river, necessitating the building of another bridge across the Arkansas at that point. (Sept. 23, p. 696.)

CINCINNATI, GEORGETOWN & PORTSMOUTH.—Bids are being asked for building a siding between the plant of the Cincinnati Water Works, near the village of California, O., and the line of the C., G. & P. Bids will be opened Oct. 18. Charles G. Roth is the City Clerk.

COBBOSCONTEE.—Several citizens of Gardiner, Me., have petitioned the Maine Railroad Commissioners for permission to build a short narrow gauge road under the above name, to run from the Maine Central to Dam 8 in Gardiner. The cost is estimated at \$25,000 or \$30,000.

DETROIT & MACKINAC.—This company is reported to have a large force of men grading a branch to run north from Prescott, Mich., through Logan and Hill Townships to Rose City.

FREMONT, ELKHORN & MISSOURI VALLEY.—This company has bought a section of land in South Omaha which will be used to increase its yard facilities.

GRAND TRUNK.—In Superintendent Fitzhugh's report, it is stated that the work of laying the 120 miles of 80-lb. steel rails on the southern section of the Middle Division will be completed by Sept. 30. The line between Niagara Falls, Ont., and Hamilton, Ont., has been rebuilt with heavier rails and new ties. The line between those points has been rebalasted with lake shore gravel. A new yard at Fort Erie, Ont., opposite Buffalo, has been completed. A new steel bridge across Sixteen-Mile Creek, west of St. Catharines, has also been built, replacing a wooden structure.

A contract for ties for three years on the Northern Division of the main line between Toronto and Montreal has been awarded to Messrs. McCormick & McLeod of Bracebridge, Ont. About 450,000 ties are used yearly.

GULF, BEAUMONT & GREAT NORTHERN.—W. H. Hanson, who has the contract for the first 10 miles of the extension north from Kirbyville, Tex., is pushing the work along rapidly, and expects to have the roadbed ready for track laying in a few weeks. Surveyors are running lines north in the vicinity of Center. The plans call for the extension of the road to Paris, in all about 350 miles. (Sept. 19, p. 603.)

INDIANA STONE.—At the annual meeting of the stockholders of the Chicago, Indianapolis & Louisville, the directors voted to indorse the bonds of the Indiana Stone, which proposes to build a line from the C., I. & L., at Bedford, Ind., into stone fields, about 10 miles. W. H. McDoel, General Manager of the C., I. & L., is among the incorporators of the new road. (Aug. 26, p. 619.)

JONESBORO, LAKE CITY & EASTERN.—The extension of this line from Lake City, Ark., east 15 miles, is reported completed as far as Monette, 10 miles, and trains were to begin running Sept. 22. A. J. Kerfoot of Jonesboro, Ark., is General Manager. (July 22, p. 508.)

KANSAS CITY INTERURBAN.—This company has been incorporated in Missouri with a capital stock of \$300,000 to build a road from Kansas City to Lee's Summit, 20 miles. The incorporators are H. G. Pert, Henry Pfeifer, Charles H. Matthews and Chas. H. Chapin, all of Kansas City, Mo.

KEOKUK & WESTERN.—Grading is reported begun on the proposed extension of this line from Cainsville, Mo., southwest 30 miles to Pattonburg, to make connection with the Kansas City, Pittsburgh & Gulf. (Aug. 12, p. 587.)

LOUISIANA & NORTHWEST.—Track is laid for the entire distance from Magnolia, Ark., southeast

36 miles to Homer, La., and trains are now running. (Official.) J. D. Beardsley, of Gibsland, La., is General Manager. (July 8, p. 198.)

LOUISVILLE & NASHVILLE.—The improvements now in progress on this road are mainly on the main stem of the First Division, which runs from Louisville to Bowling Green, Ky. The ruling grade opposed to southbound trains will be made 0.8 per cent, and the ruling grade opposed to northbound trains 0.76 per cent. The general scheme is to reduce the grades which exceed the rates mentioned, where it is practicable. The Globe Construction Co. and John F. O'Brien and associates have the contract. A new line three miles in length between Green River and Dividing Ridge is being built. It was found better to build this new portion than to attempt to change the grade of existing track under the traffic. There are now employed 175 men, 50 teams and three steam shovels. A. R. Wing has the contract. (Official.)

MEXICAN ROADS.—In his annual message, delivered last week, President Diaz refers to the railroads of Mexico as follows:

Between April and this date our railway system has increased by more than 314 kilometers [195 miles], of which 62½ [38.8 miles] appertain to the Mexico Cuernavaca and Pacific Railroad [Apr. 15, p. 285]; 90 [37.3 miles] to the Mexican Central in its branch from Jimenez to Hidalgo del Parral [Apr. 9, p. 656]; 40 [24.9 miles] to the Mexican National between Patzcuaro and Uruapan [Feb. 25, p. 148]; 25 [15.6 miles] to the International on its branch between Reata and Monterey [Sept. 9, p. 656]; and the remainder to other lines, among which may be mentioned that which has lately joined the capitals of Yucatan and Campeche, an event which has with reason been celebrated with rejoicings by both states. To-day the line between San Juan Bautista and the Gonzalez River was inaugurated.

The railway system of the republic now measures 12,403 kilometers [7,707 miles], including 234 kilometers [145.5 miles] of state-owned tramways. Some of the companies have either executed or have in preparation noteworthy works on their lines, such as the completion of the tunnel between Dolores and Catorce, which is 2 kilometers [1.25 miles] in length; the permanent station building of the Mexican Southern at Oaxaca; and the plans for the introduction of electrical traction on certain of its lines presented by the Federal District Railway Company.

On account of the severe damage periodically suffered by the provisional bridges of the Tehuantepec Railroad over the river of the same name, a new location of the road at that point has been undertaken, so that the line may cross the river under favorable conditions and by a metallic bridge. During the period covered by this report 12 new railway concessions have been granted, and 3 have been declared forfeited.

Since my last report four new telegraph offices have been opened to the public; a new line has been strung between Esperanza and Tehuacan, and the lines between Banamichi and Arizpi and Teapa and Pichucalco have been incorporated into federal telegraph systems. The advantage of constant telegraph service has been extended to 36 more towns.

Alfredo King and Julio Blumenkron, of Puebla, Mexico, are reported to be building a railroad in the state of Puebla, from San Martin, on the line of Interoceanic, southwest 18 km. (11.2 miles) to San Juan Tetla, at the foot of the volcano Ixtachuatli.

MISSISSIPPI RIVER, HAMBURG & WESTERN.—Rails are reported laid for about 20 miles from Hamburg, Ark., to Iron Mountain on this line from Hamburg east 46 miles to Cone City. Work is also reported in progress on the eastern end. A. M. Gibson, of Portland, Ark., is Chief Engineer. (July 8, p. 503.)

NEW ROADS.—E. H. Saltiel, Manager of the Seminole (Wyo.) Mining Co., is reported to have announced that the company will begin soon building a branch line from the Union Pacific, near Rawlins, to run north to Seminole.

Burgette & Co. of Boston are reported to have made a contract to build a line from Plant City, Fla., northeast 70 miles to Sanford. Work will be begun Oct. 1. These points are connected by the Savannah, Florida & Western.

OREGON & MISSOURI NORTHERN.—Surveys are reported completed and building is to begin soon on this line, recently incorporated in Missouri, to run from Forest City, Mo., east 17 miles to Oregon. Irving H. Wheatcroft, General Manager of the Colorado Valley at Sweetwater, Tex., is among the incorporators. (Sept. 9, p. 656.)

PECOS VALLEY & NORTHEASTERN.—Track is laid from Amarillo, Tex., to Hereford, 48 miles, and grading is completed about 20 miles beyond Hereford on this line from Amarillo, Tex., southwest 206 miles to Roswell, N. Mex. About 15 miles of grading is also completed at the Roswell end. Trains are running regularly between Amarillo and Canyon City, 18 miles, and were to be continued to Hereford on Sept. 26. About 250 men and 100 teams are at work. (Sept. 2, p. 639.) J. J. Hagerman, of Colorado Springs, Col., is President. (Official.)

PITTSBURGH & LAKE ERIE.—Work is reported completed on the Speers Run branch from Belle Vernon, on the Monongahela Division, about two miles to Speers Run to some coal mines. (Apr. 29, p. 317.)

PONTOTOC & STARKVILLE.—The supervisors of Chickasaw County have made a contract with this company to grade, cross tie, bridge and trestle 13 miles of the line from Houston, Miss., north to the Pontotoc County line. This proposed route is practically an extension of the Gulf & Chicago from Pontotoc, Miss., south about 60 miles via Houston, to Starkville on the Illinois Central. N. B. Crawford of Pontotoc is President. (July 22, p. 539.)

PORTLAND & NEHALEM.—This company has been incorporated in Oregon, with a capital stock of \$100,000, to build a line from a point on the Nehalem River, near the boundary line, between Columbia and Washington counties, to run southeast about 100 miles to Portland. The incorporators are Thornburn Ross, Chamber of Commerce Building, Portland, Ore.; R. V. Pratt and E. A. Winstanley.

ST. LOUIS, OKLAHOMA & SOUTHERN.—C. M. Points, of Shawneetown, Okla. Ter., is reported as saying that surveys are completed for 200 miles on this line from Claremore, Ind. Ter., on the St. Louis & San Francisco, west and south to Stonewall, Ind. Ter., and thence into Texas. It is intended to tap coal fields, grain and stock country. (May 27, p. 383.)

SANTA ANA & NEWPORT.—Press reports state that this road, which runs from Newport, Cal., northeast 12.1 miles to Santa Ana, intends to build an extension north about 40 miles to Los Angeles. James

McFadden of Santa Ana is President and General Manager.

SANTA FE, PRESCOTT & PHOENIX.—This company has guaranteed the \$500,000 bonds of the Prescott & Eastern, which is building an extension from Phoenix, Ariz., south 26.5 miles to Mayers. (Sept. 23, p. 697.) The S. F. & P. also agrees to furnish financial aid during the building, taking stock and bonds of the P. & E. in settlement, and will operate the road when completed under a favorable lease already entered into. The annual report of the company states that the main line should be extended to Tempe and Mesa, Ariz.

SEABOARD AIR LINE.—All the grading is completed on the Logansville & Lawrenceville extension from Logansville, Ga., northwest 10.5 miles to Lawrenceville. (Sept. 9, p. 656.) Up to Sept. 20, five miles of rail was laid and surfaced. A. & C. Wright & Co., 807 E. Clay St., Richmond, Va., have the contract for the grading, trestle building, etc. (Official.)

SOUTHERN.—This company is to build a branch five miles long to the mines of the Ivy Coal & Coke Co., in Alabama.

SOUTHERN PACIFIC.—About 40 miles of track on the Central Pacific Branch is being stone ballasted. The work was begun in the vicinity of Truckee, Cal., and extends along the mountainous portions of the line.

UNION, CORNUCOPIA & EASTERN.—This company, recently organized (Sept. 2, p. 639), has been incorporated in Oregon with a capital stock of \$3,000,000 to build a line from Union southeast through Pine Valley to Ballard's Landing, on Snake River, and thence to Bear, Idaho. The main office is in Union, Ore. J. L. Story, of Union, is attorney. This company probably has close connection with the Union, Cove & Valley. (See below.)

UNION, COVE & VALLEY.—Grading is completed within 125 miles to Cove on this line from Union, Ore., north 12 miles to Cove. The work is very light. There are no cuts and only one light fill of about 2,000 cu. yds. The line requires no bridges of consequence, the longest being 16 ft. The company expects to be ready for rails and rolling stock in about 40 days. (Sept. 19, p. 603.) The officers are given under Elections and Appointments. (Official.)

UTAH & PACIFIC.—W. D. Hendricks & Son of Richmond, Utah, have received the contract for the first 76 miles of this line from Milford, Utah, southwest over the Pioche Grade to the Nevada State line. The Colorado Fuel & Iron Co. was given the contract for supplying bolts, spikes and fastenings. President A. W. McCune (Salt Lake City, Utah), is reported to have stated that the work would begin within 15 days, and he hopes to have it completed within three months. (Sept. 23, p. 697.)

Press reports state that this road is to be extended to connect with the proposed 47-mile extension of the California Eastern, which has just placed an issue of \$684,000 bonds for that purpose. (Sept. 23, p. 696.) Kessler & Co. of New York are reported to be interested in the extension.

YELLOWSTONE PARK.—This company has been incorporated in Washington with a capital stock of \$1,500,000, to build a railroad through Park and Gallatin counties in Montana. The incorporators are: W. W. D. Turner and Geo. Turner, of Spokane, Wash., and Frank A. Hall of Bozeman, Mont. These men are also interested in the Gallatin RR., now building from Three Forks, Mont., southeast about 100 miles to coal fields. (Sept. 2, p. 639.)

YORK SPRINGS.—This company was incorporated in Pennsylvania Sept. 19, with a capital stock of \$125,000, to build a line from Dillsburg, on the Cumberland Valley Line of the Pennsylvania, south about 12 miles to York Springs. The incorporators are: F. H. Alleman of Steelton; M. B. Cumber and C. W. Cloud, Carlisle; Robert L. Myers of Camp Hill; George W. Hartzell, George H. Trostle, George A. Trimmer, Anthony Deardorff, York Springs; C. W. Webbert, Boiling Springs.

Electric Railroad Construction.

BALTIMORE, MD.—The Baltimore, Marley & Mountain Bar Electric Ry. Co. is incorporated, with a capital of \$50,000. Among the incorporators are Frank S. Revell, F. Eugene Wathen, Frank L. Hancock, Robert Moss and James P. Bannon, of Anne Arundel County; John F. Williams, of Baltimore, and Walter R. Townsend, of Baltimore County.

BOSTON, MASS.—Plans and specifications for the elevated structure over the new Charlestown bridge have been completed by the engineers of the Boston Elevated Railroad, and have been placed before a number of construction companies. Bids will be received until Sept. 23. Specifications call for the completion of the contract by Jan. 1, 1899.

BROOKLYN, N. Y.—It is stated that the Brooklyn Elevated Railroad will begin equipping the Fifth and Lexington avenue lines with electricity about Oct. 15. The cost will be \$750,000.

CAMDEN, N. J.—The Camden & Suburban RR. Co., it is stated, will build an extension from Merchantville to Pensauken.

CHICAGO, ILL.—Work on the Chicago City Ry. Co.'s trolley line on Western Ave., between Archer Ave. and Thirty-ninth St., is progressing rapidly, and it is expected that within two weeks cars will be running through the Town of Lake as far as Fifty-ninth St. The poles have been erected and the stringing of the wires is nearly completed.

CLEVELAND, O.—Frank De Hass Robison, former President of the Cleveland City Cable Ry. Co., it is said, will soon ask the City Council for franchises for a system of low fare street railroads to parallel existing lines. A franchise will be asked for 25 years, the fare to be fixed at four cents and the company to pay into the city treasury 6½% of the gross receipts for the first 10 years. This, Mr. Robison says, would make it virtually a 3-cent franchise. Only a few days ago two ordinances were introduced in the City Council, by Councilmen Hopkins and Cope, to provide for four cent fares on the East Cleveland lines of the Cleveland Electric Ry. Co., and on the Kinsman street line of the Cleveland City Ry. If these ordinances are passed and agreed to by the railroad companies, then it is thought Mr. Robison's plan is not likely to be carried out.

DEDHAM, MASS.—The State Railroad Commissioners have approved the preliminary papers of the Norfolk Western St. Ry. Co., and a charter has been issued. The road will run from Memorial Hall through Dedham, Westwood, Dover and Walpole, to the town hall in Medfield, about 10 miles. The capital stock is \$90,000, and is mostly in the hands of J. J. Feely, the Treasurer, as Trustee. The Directors are: J. J. Feely, Treasurer; H. S. Draper, W. W. Mitchell, E. V. Mitchell, A. C. Smith, S. B. Jacobs and John Gourley. (Sept. 23, p. 697.)

ERIE, Pa.—The Erie Rapid Transit Co., which was organized in June to build about 20 miles of trolley road in Erie and North East Borough, will be given a franchise in the course of a few days, the special committee of the City Council having reported in favor of the project. (July 1, p. 485.)

GEORGETOWN, MASS.—The Haverhill, Georgetown & Danvers Street Ry. Co. will build a new power station this fall, probably in Byfield. In the spring the line will be extended through Byfield and Rowley to Ipswich.

HAMILTON, ONT.—Press reports state that there is a prospect of connecting the Hamilton, Grimsby & Beamsville Electric Ry. with the St. Catharines & Niagara Central, which was recently bought by Messrs. Haines Bros., 100 Broadway, New York. The distance separating the terminals of the roads is about 15 miles.

LEAVENWORTH, KAN.—An ordinance was recently passed, giving the Leavenworth & Lansing Railway Co. the right to lay double tracks and make extensions on several streets. Willard E. Winner, General Manager.

LOUISVILLE, KY.—The Louisville Ry. Co. will build an extension to Crescent Hill.

NEW BRUNSWICK, N. J.—The trolley extension of the Brunswick Traction Co. from Bound Brook, through Lincoln and Dunellen, to Plainfield, was formally opened Sept. 23.

NYACK, N. Y.—Messrs. Isaac A. Walker & Co. of Philadelphia have the contract for building the Nyack Traction Co.'s electric railroad. (Sept. 23, p. 697.)

PALMER, MASS.—The Palmer & Monson St. Ry. Co., it is stated, will build extensions in Warren and Ware.

PHILADELPHIA, PA.—Attorney General McCormick, in an opinion filed Sept. 22, refused an application for a writ of quo warranto, asked for by the Philadelphia & Merion Ry. Co. against the Philadelphia, Bala & Bryn Mawr Turnpike Company, to deprive it of its franchises by reason of its not having built a street railroad, for which it obtained a charter years ago. In his conclusion the Attorney General says: "Even if it be admitted that the turnpike company has been guilty of laches, it seems to us that there is no public interest requiring the Commonwealth to take from one company the franchise and give it to another. The petitioning company has no right to construct its railway upon the road of the turnpike company." (Aug. 6, 1897, p. 563.)

It is expected that the trolley line between Wilmington, Del., and Philadelphia, will be in operation about Oct. 1. It will be about 35 miles long. (Feb. 11, p. 111.)

PORT CHESTER, N. Y.—The Port Chester Street Ry. Co. proposes to extend its lines in Westchester County. One line beginning on Main street will run on Mill street to the New York and Connecticut boundary line. The other extension will be altogether in the town of Rye.

QUEBEC, QUE.—The annual meeting of the Quebec, Montmorency & Charlevoix Ry. was held Sept. 13. The shareholders ratified the arrangements which had been made for the purchase of the Montmorency Electric Power Co., and the purchase of that company has been completed. The amalgamation of the Quebec District Ry. Co. (electric system), the Montmorency Electric Power Co., which has all the lighting contracts in the City of Quebec, with the steam railroad company, will have the effect of considerably reducing the operating expenses and improving the service. It is proposed next year to operate the steam railroad by electricity. The election of officers resulted as follows: President, H. J. Beemer; Vice-President, Andrew Thomson; Manager and Chief Engineer, Edw. A. Evans; Secretary and Treasurer, Ernest F. Wurtele; Superintendent, W. R. Russell; Directors, E. E. Webb, Frank Ross, William Hanson, Hon. S. N. Parent, Judge E. Chauveau. (June 3, 10; pp. 400, 421.)

QUINCY, ILL.—Since the street railways were bought by Mr. W. B. McKinley, representing the Eastern syndicate, new machinery has been bought for the power plant at a cost of about \$100,000; six miles of new track have been laid with 60-ft. rails, 4½ miles having cast welded joints; 18 double equipments of Westinghouse No. 49 motors have been bought to replace old equipment of cars now in service, and six new closed cars with all modern improvements have been ordered from the Pullman Palace Car Co. Other improvements will be made as rapidly as possible and more new cars will be ordered next spring. (Aug. 5, p. 588.)

WATERTOWN, N. Y.—The Black River Traction Co. recently bought for \$35,000 the plant of the defunct Watertown Brass Co., the plant of the Thermometer Co., and the City Mills in Newell street. It is the company's intention to build a large power house and the contract will be let at once.

YARMOUTH, N. S.—It is reported that the Yarmouth Electric Street Ry. will be extended to Port Maitland in the spring.

YORK, PA.—It is reported that the York Southern Railroad Company will adopt the trolley on the branch from Delta to Peach Bottom, a steam line four miles long.

GENERAL RAILROAD NEWS.

Railroad Earnings.

Showing the gross and net earnings for the periods ending at the dates named:

	June 30.	1898.	1897.	Inc. or Dec.
Maine Central.				
12 months.....	Gross	\$4,758,901	\$4,898,036	D. \$139,235
12 ".....	Net	1,761,557	1,612,467	I. 149,090

July 31.	1898.	1897.	Inc. or Dec.
Baltimore & Ohio.			
1 month	Gross \$2,315,000	\$2,245,492	I. \$69,508
1 "	Net 461,006	555,345	D. 94,339
7 months	Gross 15,943,379	14,314,261	I. 1,629,118
7 "	Net 3,944,605	2,740,559	I. 1,204,046
Burlington, Cedar Rapids & Northern.			
1 month	Gross \$308,326	\$316,170	D. \$13,844
1 "	Net 72,873	58,421	I. 14,452
7 months	Gross 2,221,839	2,183,002	I. 38,837
7 "	Net 669,551	646,767	I. 22,784
Chicago, Indianapolis & Louisville.			
1 month	Gross \$294,645	\$303,294	D. \$8,649
1 "	Net 197,180	210,674	D. 13,494
7 months	Gross 1,834,953	1,720,588	I. 114,365
7 "	Net 508,336	491,686	I. 16,650
Kansas City, Fort Scott & Memphis.			
1 month	Gross \$342,473	\$370,223	D. \$27,750
1 "	Net 105,164	115,987	D. 10,823
Lake Erie & Western.			
1 month	Gross \$263,545	\$270,539	D. \$6,994
1 "	Net 107,361	107,777	D. 416
7 months	Gross 1,912,324	1,906,288	I. 6,036
7 "	Net 720,723	745,673	D. 24,950
Minneapolis, St. Paul & Sault Ste. Marie.			
1 month	Gross \$311,973	\$329,493	D. \$17,520
1 "	Net 124,244	142,976	D. 18,732
7 months	Gross 1,994,881	1,922,719	I. 72,162
7 "	Net 765,954	716,259	I. 49,695
Philadelphia & Reading.			
1 month	Gross \$1,688,072	\$1,916,595	D. \$228,523
1 "	Net 655,385	840,375	D. 184,990
7 months	Gross 11,788,741	11,315,296	I. 473,445
7 "	Net 4,703,563	4,595,185	I. 108,378
Philadelphia & Reading Coal & Iron Co.			
1 month	Gross \$1,356,243	\$2,075,753	D. \$719,510
1 "	Net 99,150	160,444	D. 61,294
Pittsburgh & Western.			
1 month	Gross \$265,656	\$277,667	D. \$12,011
1 "	Net 72,675	96,952	D. 24,277
7 months	Gross 1,825,917	1,628,956	I. 196,961
7 "	Net 540,850	546,353	D. 5,503
Savannah, Florida & Western.			
1 month	Gross \$421,067	\$255,464	I. \$165,603
1 "	Net 164,557	62,042	I. 102,515
7 months	Gross 2,482,380	1,990,168	I. 492,212
7 "	Net 774,185	586,904	I. 177,281
August 31.	1898.	1897.	Inc. or Dec.
Alleghany Valley.			
1 month	Gross \$244,199	\$217,674	I. \$26,525
1 "	Net 119,518	118,652	I. 866
8 months	Gross 1,732,378	1,587,490	I. 144,888
8 "	Net 699,653	622,624	I. 77,029
Atchison, Topeka & Santa Fe.			
1 month	Gross \$3,004,107	\$3,214,581	D. \$210,473
1 "	Net 482,560	921,280	D. 438,720
2 months	Gross 5,771,105	5,808,812	D. 37,706
2 "	Net 962,253	1,386,036	D. 423,783
Chesapeake & Ohio.			
1 month	Gross \$1,038,305	\$1,006,409	I. \$31,896
1 "	Net 366,966	346,240	I. 20,726
2 months	Gross 1,989,894	1,964,109	I. 25,785
2 "	Net 704,240	682,633	I. 21,607
Chicago & Northwestern.			
1 month	Gross \$3,414,353	\$3,126,123	I. \$288,230
2 months	Gross 9,229,520	8,984,663	I. 244,857
Chicago, Milwaukee & St. Paul.			
1 month	Gross \$3,019,787	\$2,780,614	I. \$239,173
1 "	Net 1,111,915	1,092,125	I. 19,790
2 months	Gross 5,554,480	5,493,508	I. 60,972
2 "	Net 1,994,436	2,041,963	D. 47,527
Cincinnati, New Orleans & Texas.			
1 month	Gross \$417,346	\$304,707	I. \$112,639
1 "	Net 146,024	88,717	I. 57,307
2 months	Gross 817,885	617,309	I. 200,576
2 "	Net 289,316	190,020	I. 99,296
Northern Central.			
1 month	Gross \$560,736	\$635,097	D. \$74,361
1 "	Net 188,576	245,966	D. 57,390
8 months	Gross 4,104,044	4,209,185	D. 105,141
8 "	Net 1,024,793	1,227,133	D. 202,340
Northern Pacific.			
1 month	Gross \$2,180,575	\$1,828,560	I. \$352,015
1 "	Net 1,164,733	814,054	I. 350,679
2 months	Gross 4,097,274	3,668,921	I. 428,352
2 "	Net 2,134,610	1,700,582	I. 434,027
Southern.			
1 month	Gross \$1,993,232	\$1,747,356	I. \$245,876
1 "	Net 699,339	501,495	I. 197,844
2 months	Gross 3,964,405	3,355,029	I. 609,376
2 "	Net 1,138,036	896,865	I. 241,171

BALTIMORE & OHIO.—The Reorganization Committee gives notice that under the reorganization agreement of June 22 the final installment of 25 per cent. cash payment of \$2 per share on the first preferred stock and \$20 per share on the second preferred and common stock is called for payment on or before Oct. 10 at the Mercantile Trust Co., New York. (July 1, p. 486.)

Speyer & Co., of New York, give notice that they have deposited the 5 per cent. bonds of 1885 consenting to their agreement to make them subject to the reorganization plan of June 22. They are prepared to exchange the Mercantile Trust Co. certificates of deposit received for these bonds against the Trust receipts issued under the original agreement. (July 1, p. 486.)

BROOKLYN ELEVATED.—Frederick Uhlmann, Receiver, is reported as saying that the company is to be reorganized and out of the hands of the receiver within 30 days. All assessments on the old stock of the company have been paid. Since trains began running across Brooklyn Bridge the receipts have largely increased. (July 1, p. 486.)

CALIFORNIA NORTHWESTERN.—This company has leased the San Francisco & Northern Pacific, agreeing to pay all the expenses, including the first charges of the leased line. The C. N. W. was recently incorporated to build an extension of about 60 miles of the S. F. & N. P., to run northwest into the redwood forests of Mendocino and Humboldt counties, Cal. The S. F. & N. P. runs from Point Tiburon, Cal., across from San Francisco, north 106 miles to Ukiah, with several branches aggregating 165.32 miles. Gilbert Palache of San Francisco is President of the C. N. W. (Aug. 19, p. 603.)

CANADIAN PACIFIC.—Twenty-one bonds of £500, and 64 bonds of £100 each, in all £16,900, of the Canadian Central 5 per cent. first mortgage bonds,

have been drawn for payment at Speyer Bros., London, at 105.

DETROIT & LIMA NORTHERN.—At the request of the Eastern stockholders, Judge Hammond of the United States Court at Toledo, O., on Sept. 22, appointed Julius Bates co-receiver with Jas. B. Townsend, appointed Sept. 6. (Sept. 16, p. 680.)

FITCHBURG.—Kidder, Peabody & Co. have bought 16,000 shares of preferred stock at a price said to be at or above par. The railroad company will use the proceeds, it is stated, to pay off \$750,000 of 5 per cent. bonds which matured in March, 1889, and \$500,000 of similar bonds which mature June 1, 1900. This is part of the issue of \$17,360,000 preferred stock, of which \$2,000,000 has been held in the treasury of the company. (Feb. 4, p. 90.)

INDIANA, ILLINOIS & IOWA.—New 50-year 5 per cent. bonds to the value of \$2,500,000, to be issued in taking up old bonds, have been sold to Redmond, Kerr & Co., and Lee, Higginson & Co. Of this amount \$500,000 was offered last week for public subscription at 102½, and was largely over subscribed. President Shonts states that the mortgage securing these bonds is the first and only obligation and covers the entire property at \$16,000 per mile. There are \$500,000 additional bonds to be held in the company's treasury and to be issued only for new building, at not to exceed \$16,000 per mile. It is now proposed to build 35 miles of line from Streator, Ia., via Rostant, to Bureau Junction on the Chicago, Rock Island & Pacific. When this extension is completed the lease of trackage to Seneca will be discontinued. A provision of the bonds is that they may be called at 30 days' notice at 110 and accrued interest. The bondholders have a right to elect two members of the Board of Directors. The mortgage trustees are the Continental Trust Co. and Joseph D. Oliver.

The company gives notice that it has decided to exercise its option of redeeming all the first mortgage 5 per cent. gold bonds of 1943 outstanding on Oct. 1 next, at 105 and accrued interest. It will also redeem on the same day, at par and accrued interest, all the first mortgage 4 per cent. gold bonds of 1939, and the first and second income 4 per cent. gold bonds of 1939.

Articles of incorporation have been filed in Indiana for the consolidation with the Indiana, Illinois & Iowa of Indiana, with a capital stock of \$4,000,000. (Sept. 23, p. 698.)

KANSAS CITY, FORT SCOTT & MEMPHIS.—Seven first mortgage 7 per cent. \$1,000 bonds of the Short Creek & Joplin, and 33 similar bonds of the Fort Scott, Southeastern & Memphis, with coupons of and from March 1, 1899, attached, have been drawn for payment after Sept. 26, at 105, upon presentation to the trustees at 50 State St., Boston.

NEW YORK CENTRAL & HUDSON RIVER.—Thomas Hitchcock of New York City, who holds stock in the New York & Harlem to the amount of \$60,000, has issued a circular to other N. Y. & H. stockholders, calling attention to the proposed action on Oct. 5 next, as to the refunding of the consolidated mortgage bonds of that company, and the proportion of the \$420,000, or saving which is to go to the N. Y. C. & H. R. He claims that by the condition of the lease the entire saving should go to the N. Y. & H., rather than only \$200,000, which was the agreement of the committee appointed by the Board of Directors of both roads. (Sept. 9, p. 657.)

OHIO SOUTHERN.—The foreclosure sale of this road, which was to take place Sept. 20, has again been postponed at the request of the Central Trust Co., New York, which holds the first mortgage bonds. (Sept. 23, p. 698.)

PENNSYLVANIA COMPANY.—Proposals will be received until Oct. 25, for the sale of \$7,000 first mortgage Pittsburgh, Wheeling & Kentucky bonds of Oct. 6, 1877.

PEORIA, DECATUR & EVANSVILLE.—The interest on the first mortgage bonds of both the Peoria and Evansville divisions will be paid to the certificates of deposit by the bondholders' committee. (Aug. 5, p. 572.)

PORTLAND, VANCOUVER & YAKIMA.—A meeting of the stockholders will be held at Vancouver, Wash., Nov. 4, at 1 p. m., to consider a proposition to increase the capital stock to \$200,000. This increase is for making the proposed extensions. (Sept. 23, p. 697.)

ST. LOUIS SOUTHWESTERN.—This company is reported to have made an agreement with Attorney General Crane of Texas, in the suit for the forfeiture of the charter of the company on the ground that it has not been complying with the state law requiring it to keep its offices in that state. The agreement is that beginning Oct. 1, the Texas property will be operated entirely distinct from that of the Missouri and Arkansas corporations, and that the bookkeeping will be done at the Tyler general offices, in strict accord with the demands of the State Railroad Commission. (Sept. 16, p. 680.)

SOUTHERN.—Hereafter the annual election of officers will take place on the Tuesday preceding the first Wednesday in October, instead of on the first Monday in August.

TERRE HAUTE & LOGANSPOUT.—Wm. F. Fishback, Master in Chancery of the United States Circuit Court for the District of Indiana, has advertised the sale of this road to take place at Crawfordsville, Ind., Oct. 20, at 12 o'clock noon. Bidders are required to deposit \$25,000 in cash or by acceptable certified check, and the upset price is fixed at \$750,000. This line runs from South Bend, Ind., to Rockville, 161 miles, with trackage from Rockville to Terre Haute, 22 miles. It is leased to the Terre Haute & Indianapolis for 99 years, from December, 1897, at 25 per cent. of the gross earnings, and the first mortgage bonds guaranteed. It has been in the hands of the receiver since Nov. 13, 1896.

TRAFFIC.

Traffic Notes.

The Texas railroads will refuse to adopt the freight rates on canned goods recently ordered by the State Railroad Commissioners. A schedule of cotton rates has been agreed upon by the roads and will be presented to the Commissioners next week.

The Board of Commissioners of the Western Trunk Line Committee has decided to continue the present scale of minimum carload weights on live stock without change. The proposition was to include 34-ft. cars in the same group with 31-ft. cars.

Another effort is to be made to revive the old Trans-Continental Passenger Association, or else include the territory in the agreement of the Trans-Missouri Association. The attitude of the Union Pacific is likely to be a controlling factor in determining the matter.

Retail merchants in Bloomington and other towns in Illinois on the line of the Chicago & Alton are getting up a strong protest against the action of the Alton road in running frequent cheap excursions to Chicago. These merchants threaten to turn their freight business to other roads.

New York papers report this week that there is serious demoralization in westbound freight rates. Shipments by rail all the way are said to be taken on the basis of 50 cents per 100 lbs., first-class, to Chicago, which is one-third less than the tariff. It is said that the Pennsylvania, the New York Central and the Erie are strictly maintaining rates.

The North Carolina Car Service Demurrage Association has been formed by the railroads of that state and will begin operations October 1. The manager is Mr. P. R. Albright and his headquarters will be at Raleigh. The roads signing the announcement are the Atlantic Coast Line, the Southern Railway, the Norfolk & Western and the Cape Fear & Yadkin Valley.

Rates for the transportation of freight by steamship between New York City and ports in Maine have been reduced about 50 per cent. A new line has been established between New York and Bangor by the Manhattan Steamship Company, and the old line, the Maine Steamship Company, running between New York and Portland, has made radical reductions in its tariff.

The Western Passenger and Central Passenger chairmen have been authorized to confer and work in harmony in the matter of reduced rates to clergymen and representatives of religious bodies. It was not thought advisable to place this business in the hands of a joint bureau, but the Central Passenger lines will bring their agreement into conformity with that of the Western lines.

Chicago Traffic Matters.

Chicago, Sept. 28, 1898.

Freight rates to the East are in a shattered condition. Grain is being taken at cuts of from 6 to 8 cents per 100 lbs., and provision rates are being quoted at from 8 to 10 cents below the printed tariffs. Just what has caused the present demoralization nobody seems to know. A great deal of the grain from the West to the East is now moving through the outside junction points, Peoria and Milwaukee particularly. One cause of this diversion from the inside junctions and what is known as Chicago proper is the exaction of high switching and terminal charges by the local lines. The through grain business via Chicago so far this season is far behind that of last season, although the total volume moving is probably no less. It can be said with safety that but two roads, the Michigan Central and the Pennsylvania, are adhering strictly to tariffs in both grain and provisions.

Chicago and St. Paul roads are in a stew over the action of the Canadian Pacific in announcing that it would use the \$9.70 rail and lake rate to the East for basing purposes, as against the regular all-rail rate of \$11.50. From time out of memory the St. Paul lines have sold tickets to the East via Milwaukee and the lines across the lake on a \$9.70 basis. Not one ticket in 500 to the East is sold by this route, but the Canadian Pacific took advantage of the fact that such a basis was in existence and applied it on its through rates. The Chicago and St. Paul roads will probably change their St. Paul-Chicago basing rate from \$11.50 to \$9.70.

The roads carrying grain from Kansas and Nebraska to the Atlantic seaboard, which are now mourning the loss of a large share of their former export grain business, attribute most of this loss to the fact that the roads to the Gulf of Mexico can make a good profit on this grain while still seriously underbidding the Eastern lines. But it now appears that the Gulf lines do not live in clover all of the time; the Atchison, which carries grain both East and South, has made reductions of 5 cents per 100 lbs. on wheat and 2 cents on corn, from Kansas points to both Chicago and Galveston. This rate will go into effect Oct. 1. Officers of this road say that this action is to meet the secret cut rates of the St. Louis lines. The other lines from the Missouri River to Chicago have already announced tariffs to meet the Atchison's reduction. It is said that the lines from St. Louis to Baltimore and Newport News are carrying grain at 7 cents. As the rate from Kansas City to St. Louis is 5 cents, the through rate via St. Louis to the Atlantic seaboard is about 12 cents. This ought to divert business from the Gulf routes.

The General Passenger Agents of the Western roads have decided to make no change in the rates from Kansas City and lower Missouri River points to North Pacific coast territory, as requested by the Chicago Great Western. The matter will be further considered at a meeting of the trans-continental lines to be held in New York Oct. 20.

All trans-continental passenger rates have now been restored, and the long-continued and bitterly contested Canadian Pacific rate war is at an end for the present at least. Since the war was inaugurated little attention has been given to commissions. Now that the cheap rates are out, the question of returning to the old basis of ticket commissions will have to be settled. This will be done, it is thought, without much trouble.

Owing to the approaching municipal elections it is not believed that any anti-scalping legislation is possible in Chicago for some time. The Corporation Counsel has unofficially announced that he is opposed to the ordinance now proposed on the ground of its unconstitutionality. The matter will be probably dropped by the Peace Jubilee Committee and by the railroads until a more opportune time. In the meantime the eastbound lines will not attempt to turn public opinion against them by refusing to make low rates for the celebration. But the anti-scalping war will not be abandoned by either the Eastern or the Western lines; it will only rest in abeyance until elections and patriotic gatherings are out of the way. The Chicago scalpers seem to have more political influence than the railroads.